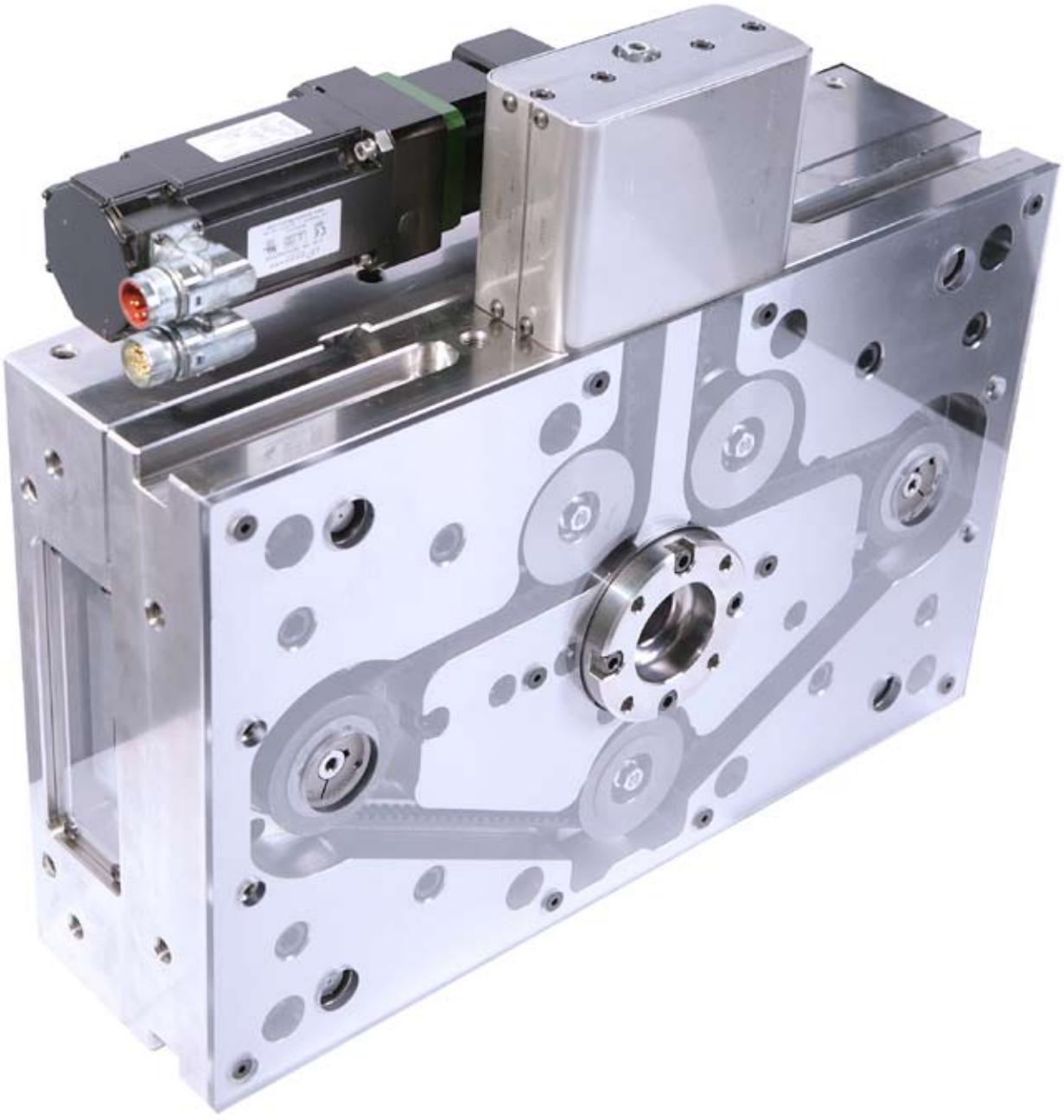
E-Drive™

User Manual



Mold Masters®
performance delivered

Table of Contents

Section 1 - Introduction 1-1

Warranty and Documentation 1-1

Release Details 1-1

Trademarks and Patents 1-2

Section 2 - Global Support 2-1

Manufacturing Facilities 2-1

Regional Offices 2-1

International Representatives 2-2

Section 3 - Safety 3-1

Introduction 3-1

Safety Hazards 3-1

E-Drive Safety Warnings 3-4

E-Drive Cautions 3-4

Mag-Pin Safety 3-4

Section 4 - Preparation 4-1

Introduction 4-1

Screw Lengths 4-1

Tools Required 4-2

Unpacking 4-3

Cleaning 4-3

Establishing Your System Type 4-3

Typical E-Drive System 4-4

E-Drive Components 4-6

©09-2010 Mold Masters

Section 5 - Assembly 5-1

Introduction 5-1

Complete Assembly (3D View) 5-1

Complete Assembly (Center Section) 5-1

Assembly Summary 5-2

Assembly Details 5-2

First Time Installation or Replacement of the Belt 5-14

Checking for Misalignment 5-15

Section 6 - Mag-Pin Option 6-1

Introduction 6-1

Mag-Pin Assembly (3D View) 6-1

Mag-Pin Application Cautions 6-2

Mag-Pin Activation / Deactivation 6-2

Handling Magnets 6-3

Assembly Summary 6-4

Assembly Details 6-4

Mag-Pin Extraction 6-9

Section 7 - Maintenance 7-1

Introduction 7-1

Recommended Maintenance 7-1

Lubrication of Ball-Screw Assembly 7-1

Inspection of the Timing Belt 7-1

Replacement of Bearings 7-1

Assembly / Disassembly of Top Plate 7-2

Index ..... Index-i

©09-2010 Mold Masters

Section 1 - Introduction

We would like to take this opportunity to thank you for purchasing a **Mold-Masters® E-Drive™** system. The purpose of this manual is to assist users in the integration, operation and maintenance of their *E-Drive* system. This manual also provides information related to the *Mag-Pin* (Magnetic Valve Pin Holder) option.

Symbols Used in the Manual

GENERAL DESCRIPTION OF SYMBOL	
WARNING Indicates an immediate or potentially hazardous situation, which if not avoided, could result in a serious injury or death.	
CAUTION Failure to follow instructions may damage equipment	
NOTE Indicates additional information or used as a reminder	

Warranty and Documentation

Please check with your original order documentation for warranty details.

NOTE
Please do not return any parts to *Mold-Masters* without prior pre-authorization and a return authorization number supplied by *Mold-Masters (2007) Limited*.

Documentation will include one or more of the following:

- Information on the *Mold-Masters E-Drive* system in general and information on the *Mag-Pin* (Magnetic Valve Pin Holder) option.
- Parts list contains all system components. Together with the general assembly drawing, the parts list should be referenced when ordering spare parts.
- General assembly drawing used to integrate your *E-Drive* system into the mold.

WARNING
This manual must be used in conjunction with any appropriate Machine, Hot Runner, and Temperature Controller User Manual.

When ordering this manual, please reference document number: EMMEDUM05.

Release Details

Document #	Release Date	Version
EMMEDUM05	8 September 2010	05

©09-2010

Trademarks and Patents

ACCU-VALVE, DURA, FLEX-DURA FLEX-SERIES, FUSION-SERIES, HOT EDGE, INJECTIONEERING, MASTERPROBE, MASTER-SHOT, MOLD-MASTERS, MELT-DISK, MOLD-MASTERS ACADEMY, MASTER-SERIES, MASTERSOLUTION, MASTERSPEED, MERLIN, MOLD-MASTERS SYSTEM, SCAN-MASTER, STACK-LINK, are the registered trademarks of MOLD-MASTERS (2007) LIMITED.

Information contained herein is, to our best knowledge, true and accurate, but all recommendations or suggestions are made without guarantee. Since the conditions of use are beyond our control, *Mold-Masters* disclaims any liability incurred in connection with the use of our products and information contained herein. No person is authorized to make any statement or recommendation not contained herein, and any such statement or recommendation so made shall not bind *Mold-Masters*. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing patents covering any products or its use, and no license implied or in fact granted herein under the claims of any patents.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system without permission in writing from the publisher. All details, standards and specifications may be altered in accordance with technical development without prior notification.

May be manufactured under one or more of the following U.S. Patents:

5015170, 5030084, 5046942, 5049062, 5061174, 5094603, 5106291, 5118279, 5118280, 5122050, 5125827, 5135377, 5142126, 5148594, 5206040, 5217730, 5223275, 5227596, 5227181, 5235737, 5238378, 5238391, 5268184, 5269676, 5282735, 5284436, 5299928, 5312242, 5326251, 5334008, 5334010, 5346388, 5366369, 5366370, 5387099, 5405258, 5421716, 5427519, 5429491, 5437093, 5441197, 5443381, 5460510, 5474440, 5494433, 5496168, 5507635, 5507636, 5536165, 5591465, 5599567, 5614233, 5641526, 5644835, 5652003, 5658604, 5695793, 5700499, 5704113, 5705202, 5707664, 5720995, 5792493, 5795599, 5820899, 5843361, 5849343, 5853777, 5935615, 5935616, 5935621, 5942257, 5952016, 5980236, 6009616, 6017209, 6030198, 6030202, 6062841, 6074191, 6077067, 6079972, 6095790, 6099780, 6113381, 6135751, 6162043, 6162044, 6176700, 6196826, 6203310, 6230384, 6270711, 6274075, 6286751, 6302680, 6318990, 6323465, 6348171, 6350401, 6394784, 6398537, 6405785, 6440350, 6454558, 6447283, 6488881, 6561789, 6575731, 6625873, 6638053, 6648622, 6655945, 6675055, 6688875, 6701997, 6739863, 6752618, 6755641, 6761557, 6769901, 6776600, 6780003, 6789745, 6830447, 6835060, 6840758, 6852265, 6860732, 6869276, 6884061, 6887418, 6890473, 6893249, 6921257, 6921259, 6936199, 6945767, 6945768, 6955534, 6962492, 6971869, 6988883, 6992269, 7014455, 7018197, 7022278, 7025585, 7025586, 7029269, 7040378, 7044191, 7044728, 7048532, 7086852, 7105123, 7108502, 7108503, 7115226, 7118703, 7118704, 7122145, 7125242, 7125243, 7128566, 7131832, 7131833, 7131834, 7134868, 7137806, 7137807, 7143496, 7156648, 7160100, 7160101, 7165965, 7168941, 7168943, 7172409, 7172411, 7175419, 7175420, 7179081, 7182591, 7182893, 7189071, 7192268, 7192270, 7198740, 7201335, 7210917, 7223092, 7238019, 724418, 7252498, 7255555, 7258536, 7270538, 7303720, 7306454, 7306455, 7314367, 7320588, 7320589, 7320590 7326049, 7344372, 7347684, 7364425, 7364426, 7370417,7377768, 7381050, 7396226, 7407379, 7407380, 7410353, 7410354, 7413432, 7416402, 7438551, 7462030, 7462031, 7462314, 7465165, 7470122, 7507081, 7510392, 7513771, 7513772, 7517214, 7524183, 7527490, 7544056, 7547208, 7553150, 7559760, 7559762, 7565221, 7581944, 7611349, 7614869, 7614872, 7618253, 7658605, 7658606, 7671304, 7678320, 7686603, 7703188, 7713046, 7722351, 7731489, 7753676, D525592, RE38265, RE38396, RE38920, RE39935, RE40478, RE40952 + Pending.

© 2010 MOLD-MASTERS (2007) LIMITED. ALL RIGHTS RESERVED.

Section 2 - Global Support

Manufacturing Facilities

GLOBAL HEADQUARTERS
CANADA
Mold-Masters Limited
233 Armstrong Avenue
Georgetown, Ontario
Canada L7G 4X5
tel: +1 (905) 877 0185
fax: +1 (905) 873 2818
info@moldmasters.com

EUROPEAN HEADQUARTERS
GERMANY / SWITZERLAND
Mold-Masters Europa GmbH
Postfach/P.O. Box 19 01 45
76503 Baden-Baden, Germany
Neumattring 1
76532 Baden-Baden, Germany
tel: +49 7221 50990
fax: +49 7221 53093
info@moldmasters.de

ASIAN HEADQUARTERS
CHINA/HONG KONG/TAIWAN
Mold-Masters (KunShan) Co, Ltd
Zhao Tian Rd
Lu Jia Town, KunShan City
Jiang Su Province
People's Republic of China
tel: +86 512 86162882
fax: +86 512-86162883
mmc-sales@moldmasters.com

SOUTH AMERICAN HEADQUARTERS
BRAZIL
Mold-Masters do Brasil Ltda.
Rua Hum, 1106 e 1126 -
Jd. Manchester - Nova Veneza
Sumarè - São Paulo Brasil
CEP 13178-440
tel: +55 19 3922 4265
fax: +55 19 3922 4266
moldmasters@moldmasters.com.br

INDIA
Mold-Masters Technologies
Private Limited
247, Alagesan Road,
Shiv Building, Saibaba Colony.
Coimbatore T. N.
India 641 011
tel: +91 422 423 4888 - 20
fax: +91 422 423 4800
mmtplinfo@moldmasters.com

JAPAN
Mold-Masters K.K.
1-4-17 Kurikidai, Asaoku
Kawasaki, Kanagawa
Japan, 215-0032
tel: +81 44 986 2101
fax: +81 44 986 3145
info@mmkk.co.jp

UNITED KINGDOM
Mold-Masters UK /
PMS Systems Ltd
Netherwood Road
Rotherwas
Hereford
HR2 6JU
tel: +44 1432 265768
fax: +44 1432 263782
mmuk-all@moldmasters.co.uk

U.S.A.
Mold-Masters Injectioneering LLC
103 Peyerk Court
Romeo, MI 48065
tel: +1 800 450 2270 (USA)
tel: +1 (586) 752-6551
fax: +1 (586) 752 6552
info@moldmasters.com

Regional Offices

AUSTRIA / HUNGARY
Mold-Masters Handelsges.m.b.H.
Pyhrnstrasse 16
A-4553 Schlierbach
Austria
tel: +43 7582/51877
fax: +43 7582/51877 18
office@moldmasters.at

CZECH REPUBLIC
Mold-Masters Europa GmbH
Hlavni 823
75654 Zubri
Czech Republic
tel: +420 571 619 017
fax: +420 571 619 018
cz@moldmasters.eu

FRANCE
Mold-Masters France
ZI la Marinière,
2 Rue Bernard Palissy
91070 Bondoufle
tel: +33 1 82 05 00 80
fax: +33 1 82 05 00 83
mmf-info@moldmasters.eu

KOREA
Mold-Masters Korea Ltd
No.1210, Byucksan Digital Valley 5 Cha,
60-73 Gasan-dong, Geumcheon-gu,
Seoul,153-788,South Korea
Tel:+82 2 2082 4755
Fax:+82 2 2082 4756
mmkr-sales@moldmasters.com

MEXICO
MM Hot Runner Injection México, S.A. de C.V.
Av. San Carlos No. 4 - Nave 2
Parque Industrial Lerma
Lerma, Estado de México
52000, México
Tel: +52 728 282 48 33
Fax: +52 728 282 47 77
mexico@moldmasters.com

POLAND
Mold-Masters Europa GmbH
Skr. Pocztowa 59
00-908 Warszawa
Poland
tel: +48 (0) 66 91 80 888
fax: +48 (0) 66 91 80 208
pl@moldmasters.eu

Not under documentation control if printed. May be revised without notice
Electronic version is available at www.moldmasters.com
©09-2010 Mold Masters

Regional Offices - Con't

SINGAPORE / MALAYSIA
INDONESIA / THAILAND
Mold-Masters Singapore PTE. Ltd.
No 48 Toh Guan Road East
#06-140 Enterprise Hub
Singapore 608586
Republic of Singapore
tel: +65 6261 7793
fax: +65 6261 8378
mmsinfo@moldmasters.com

SPAIN
Mold-Masters España
Serennia Business Center
Buenos Aires 37-29
08902 Hospitalet de Llobregat
Barcelona, Spain
tel: +34 93 802 36 01
fax: +34 93 802 49 08
spain@moldmasters.eu

International Representatives

Argentina
Sollwert S.R.L.
La Pampa 2849 2∫ B
C1428EAY Buenos Aires
Argentinia
tel: +54 11 4786 5978
fax: +54 11 4786 5978 Ext. 35
sollwert@fibertel.com.ar

Australia
Comtec I P E
1084 South Road,
Edwardstown, South Australia 5039
PO Box 338, Magill,
South Australia 5072
tel: +61 8 8374 4633
fax: +61 8 8299 0892
bparrington@comtecipe.com

Bulgaria
Mold-Trade OOD
62, Aleksandrovska St.
Ruse City
Bulgaria
tel: +359 82 821 054
fax: +359 82 821 054
contact@mold-trade.com

Denmark, Norway, Sweden
H. & G. Englmayer A/S
Skenkelsoevej 9, Postbox 35
DK - 3650 Oelstykke, Denmark
tel: +45 46 733847
fax: +45 46 733859
support@englmayer.dk

Finland
Oy Scalar Ltd.
Viertolantie 12
11120 Riihimaki, Finland
tel: +358 19 783 191
fax: +358 19 783 190
info@scalar.fi

Hong Kong
Nicko International Ltd.
Rm 1203, Chevalier Commercial Centre
8 Wang Hoi Road,
Kowloon Bay, Hong Kong
tel: +852 2755 2783
fax: +852 2798 8656
sales@nicko.com.hk

Israel
ASAF INDUSTRIES Ltd.
29 Habanai Street
PO Box 5598 Holon 58154
Israel
tel: +972 3 5581290
fax: +972 3 5581293
sales@asaf.com

Italy
Commerciale Isola SPA
Via G.B. Tiepolo 3
35010 Cadoneghe, (Padova), Italy
tel: +39 49 706600
fax: +39 49 8874231
info@com-isola.it

Portugal
Gecim LDA
Rua Fonte Dos Ingleses, No 2
Engenho
2430-130 Marinha Grande, Portugal
tel: +351 244 575600
fax: +351 244 575601
gecim@gecim.pt

Romania
International Mold Trade Co. SRL
Str. Constantin Aricescu, Nr. 21
Bl. 20, Sc. 2, Apt. 20
Bucharest - Sector 1, Romania
tel: +4 021 230 60 51
fax : +4 021 231 78 43
contact@matritehightech.ro

Turkey
MMG Consulting & Engineering
Yesil Çesme Sok No:30/3
Çiftehavuzlar 81060, Istanbul, Turkey
tel: +90 216 357 0783
fax: +90 216 385 0656
mustafa.gevrek
@mmgmuhendislik.com

Vietnam
Lotus Chemical Technology
393 Dien Bien Phu St., Ward 4, Dist. 3,
HoChiMinh City, Vietnam
tel: +84 8 832 7605,
fax: +84 8 832 7730
dieuphuoc.nguyen@lotusfirma.com

©09-2010 Mold Masters

Section 3 - Safety

Introduction

Any instructional material provided by *Mold-Masters* for the operation and maintenance of equipment, does not in any way absolve the employer from fulfilling the following obligations and *Mold-Masters* disclaims liability for injury to personnel using equipment supplied.

It is the responsibility of the employer to:

- Ensure the original and continuing competence of personnel caring for, setting up, inspecting and maintaining injection molding equipment.
- Establish and follow a program of periodic and regular inspections of injection molding equipment to ensure they are in safe operating condition and proper adjustment.
- Ensure that no modifications, repairs, or rebuild of portions are made to the equipment that reduces the level of safety existing at time of manufacture or remanufacture.

Safety Hazards

The following safety hazards are most commonly associated with plastic injection molding equipment (From the American National Standard for Plastics Machinery Horizontal Injection Molding Machines-ANSI/SPI B151.1- 2007).

WARNING
For Safety Information also refer to all machine manuals and local regulations and codes.

(1) Mold area

(2) Clamping mechanism area

(3) Area of movement of core and ejector drive mechanisms outside areas 1& 2

(4) Nozzle area

(5) Plasticizing and or injection unit area

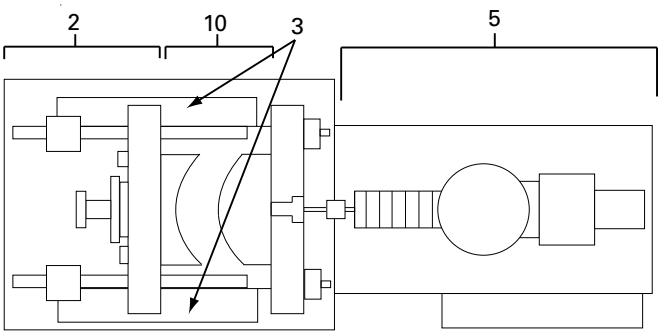
(6) Feed opening area

(7) Area of the heater bands of the plasticizing and/or injection cylinders

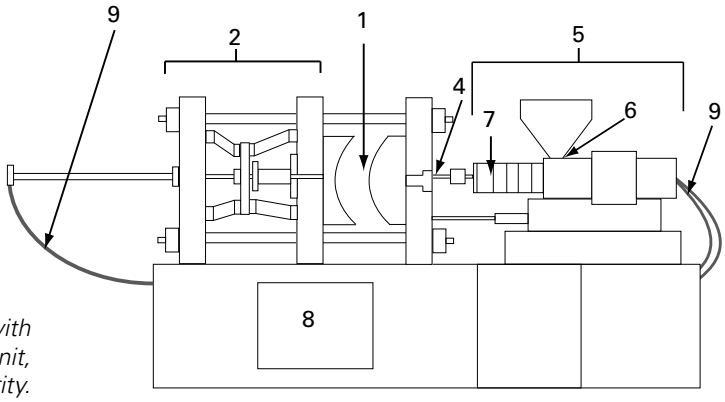
(8) Parts discharge area

(9) Hoses

(10) Area inside the guards and outside the mold area



Top View with Guards Removed



Front View with Guards Removed

- *Figure 3-1: Injection molding machine (HIMM) with horizontal clamping unit and horizontal injection unit, shown without guards for illustration clarity.*

Hazard Area	Potential Hazards
Mold Area Area between the platens. See Figure 3-1 item 1	**Mechanical Hazards** Crushing and/or shearing and/or impact hazards caused by: • Movement of the platen Movements of the injection barrel(s) into the mold area Movements of cores and ejectors and their drive mechanisms. • Tie bar motion. **Thermal Hazards** • Burns and/or scalds due to operating temperature of: • The mold heating elements of the molds. • Plasticized material released from/through the mold.
Clamping Mechanism Area See Figure 3-1 area 2	**Mechanical Hazards** Crushing and/or shearing and/or impact hazards caused by: • Movement of the platen. • Movement of the drive mechanism of the platen. • Movement of the core and ejector drive mechanism.
Movement of drive mechanisms outside the mold area and outside the clamping mechanism area. See Figure 3-1 area 3	**Mechanical Hazards** Mechanical hazards of crushing, shearing and/or impact caused by the movements of: • Core and ejector drive mechanisms.
Nozzle area The nozzle area is the area between the barrel and the sprue bushing. See Figure 3-1 area 4	**Mechanical Hazards** Crushing, shearing hazards, and/or impact hazards caused by: • Forward movement of the plasticizing and/or injection unit including nozzle. • Movements of parts of-the power operated nozzle shutoff and their drives. • Over pressurization in the nozzle. **Thermal Hazards** Burns and or scalds due to operating temperature of: • The nozzle. • Plasticized material discharging from the nozzle.
Plasticizing and/or injection unit area Area from the adaptor/barrelhead/end cap to the extruder motor above the sled including the carriage cylinders. See Figure 3-1 area 5	**Mechanical Hazards** Crushing, shearing and/or drawn into hazards caused by: • Unintentional gravity movements e.g. for machines with plasticizing and/or injection unit positioned above the mold area. • The movements of the screw and/or the injection plunger in the cylinder accessible through the feed opening. • Movement of the carriage unit. **Thermal Hazards** Burns and or scalds due to operating temperature of: • The plasticizing and/or injection unit. • The heating elements e.g. heater bands. • The plasticized material and/or vapors discharging from the vent opening, feed throat or hopper. **Mechanical and/or Thermal Hazard** Hazards due to reduction in mechanical strength of the plasticizing and/or injection cylinder due to overheating.

©09-2010 Mold Masters

Hazard Area	Potential Hazards
Feed Opening See Figure 3-1 area 6	Pinching and crushing between injection screw movement and housing.
Area of the heater bands of the plasticizing and/or injection cylinders See Figure 3-1 area 7	Burns and or scalds due to operating temperature of: • The plasticizing and/or injection unit. • The heating elements e.g. heater bands. • The plasticized material and/or vapors discharging from the vent opening, feed throat or hopper.
Parts Discharge Area See Figure 3-1 area 8	**Mechanical Hazards** Accessible Through the Discharge Area Crushing, shearing and/or impact hazards caused by: • Closing movement of the platen Movements of cores and ejectors and their drive mechanisms. **Thermal Hazards** Accessible Through the Discharge Area Burns and or scalds due to operating temperature of: • The mold. • Heating elements of the mold. • Plasticized material released from/through the mold.
Hoses See Figure 3-1 area 9	• Whipping action caused by hose assembly failure. • Possible release of fluid under pressure that can cause injury. • Thermal hazards associated with hot fluid.
Area Inside the Guards and Outside the Mold Area See Figure 3-1 area 10	Crushing and/or shearing and/or impact hazards caused by: • Movement of the platen. • Movement of the drive mechanism of the platen. • Movement of the core and ejector drive mechanism. • Clamp opening movement.
Electrical Hazards	• Electric shock or burns due to contact with live conductive parts. • Electrical or electromagnetic disturbance generated by the motor control unit. • Electrical or electromagnetic disturbance that can cause failures in the machine control systems and adjacent machine controls. • Electrical or electromagnetic disturbance generated by the motor control unit.
Hydraulic Accumulators	High pressure discharge.
Power Operated Gate	Crush or impact hazards caused by the movement of the power operated gates.
Vapors and Gases	Certain processing conditions and or resins can cause hazardous fumes or vapors.

E-Drive Safety Warnings

Never touch or inspect the timing belt when power is on and *E-Drive* motor and controller are connected. Unplug the controller before any maintenance.

Do not operate the equipment with unconfined long hair, loose clothing or jewellry, including name badges, neckties, etc. These may get caught by the moving belt mechanism and can cause death or serious injury.

Always cover belt area with proper protecting sheet before any bench test or in-mold testing.

High Voltage and amperage cables are connected to *E-drive* controller (220VAC). Also there is high voltage cable connection between servo motor and controller.

Unplug the controller before performing any maintenance work.

E-Drive Cautions

Make sure the controller power supply is unplugged (or turned off) before plugging in the cables of the motor. Otherwise it can cause damage to the motor (do not "hot-plug" the motor!).

Carefully read the instructions before operating the equipment. If in doubt, contact *Mold-Masters* for clarification.

E-Drive components are rated to operate at temperatures less than 70°C (158°F). Do not heat the hot runner system without connecting a proper cooling system. In addition, if in your application mold temperature needs to be set above 70°C (158°F), use proper mold design for high temperatures. In high temperature applications, an additional insulation plate and support plate need to be installed above the manifold plate (See *E-Drive* Catalogue Pages). In addition, plates above manifold plate need to be cooled with separate cooling line set at lower temperatures (recommended temperature is below 50°C).

Mag-Pin Safety

WARNING

When the *E-Drive* system is equipped with a magnetic valve pin holder in the synchro-plate it is equipped with very strong magnets. Be careful of potential pinch hazards when handling the magnets.

CAUTION

Assembly of the magnetic valve pin holder parts must be done in a clean area that is free of metal chips. Ensure parts are clean of metal before assembly.

Do not place the magnets close to other magnets or other ferromagnetic parts. Their light weight and high magnetic strength can cause a powerful collision force that may cause the magnet to chip or break due to impact.

©09-2010 Mold Masters

Section 4 - Preparation

Introduction

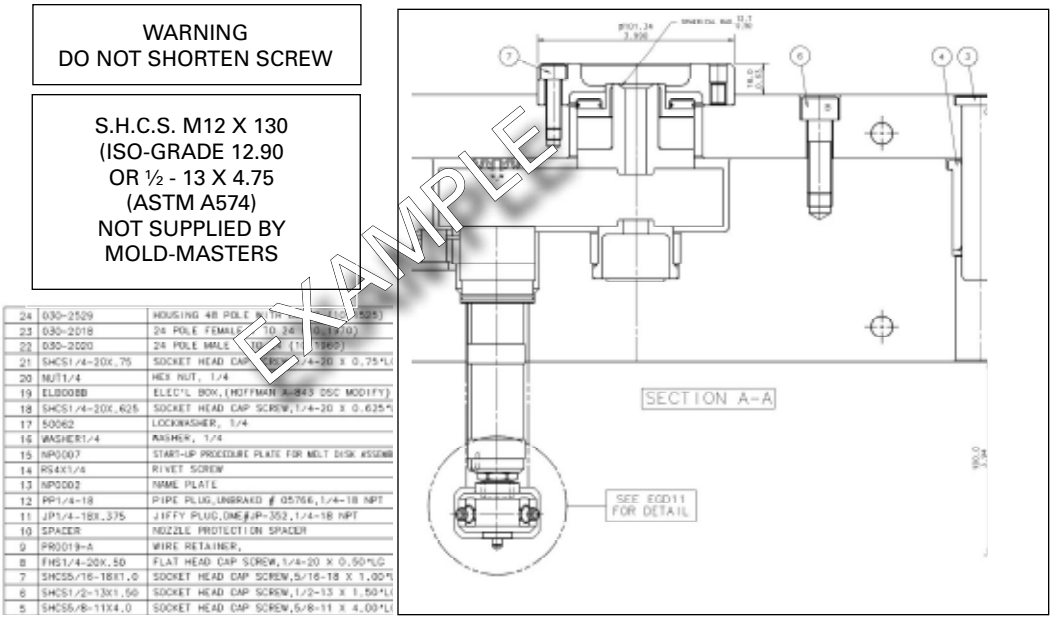
The following section is a step-by-step guide to preparing your *Mold-Masters E-Drive* system for use.

Screw Lengths

WARNING
The use of an incorrect size, length and grade screw could cause the screw to shear, fatigue or stretch beyond its yield point, resulting in expensive downtime of the hot runner.

Be aware of warnings placed on the assembly drawings. When the manifold is heated the metal expands stretching the mounting screws, if screw lengths are shortened there is a possibility of shearing.

The expansion factor is calculated into the length of each screw size.



Tools Required

Depending on the size and complexity of your hot runner system, you will require most of the tools and materials listed below.

- Allen keys - Set of imperial size keys and metric sizes 4, 5, 6, 8 and 10 mm for use on both imperial and metric cap screws (depending on system)
- Anti-seize compound - To prevent oxidation of screw threads that could cause screws to seize with high temperatures
- Solvents (denatured alcohol) - For removal of rust inhibitors
- **Calibrated** torque wrench - For consistent screw pressure throughout the system
- Pliers - For general assembly work
- Circlip pliers - To remove and install Circlip in valve systems
- Micrometer - (sizes 0 - 6" and 0 - 150 mm) To check system part and plate thickness
- Depth micrometer - To check bore depths
- Slot head screw driver - Used in installing thermocouples and ground wires
- Slot head screw driver (small) - Used in fastening electrical wires to connectors
- Crimping tool - For fastening connector pins when necessary
- Wire strippers - For preparing wires
- Utility knife - For cutting tape, wires etc.
- Glass tape - Used for grouping wires into zones
- Bluing Compound - For checking face contact
- Sockets
- Lapping compound for valve gate systems
- Plastic face hammer
- Valve pin pulling tool
- Long M5 hex key with T-handle and snap ring in tip (*Mold-Masters* item number: KEY-BPHEXTKEY5.0)
- Grease: Castrol Longtime PD2 (*Mold-Masters* part number: 104L1105I)
- Proper Valve Pin extraction tools

Not under documentation control if printed. May be revised without notice
Electronic version is available at www.moldmasters.com
©09-2010 Mold Masters

Unpacking

1. Carefully remove all components from the shipping box and check that all components listed on the parts list were supplied.
2. Check that all mold base dimensions are correct and correspond to *Mold-Masters* general assembly drawings.

Cleaning

All nozzles, manifolds and hot runner components must be free of the rust inhibitor applied at the factory.

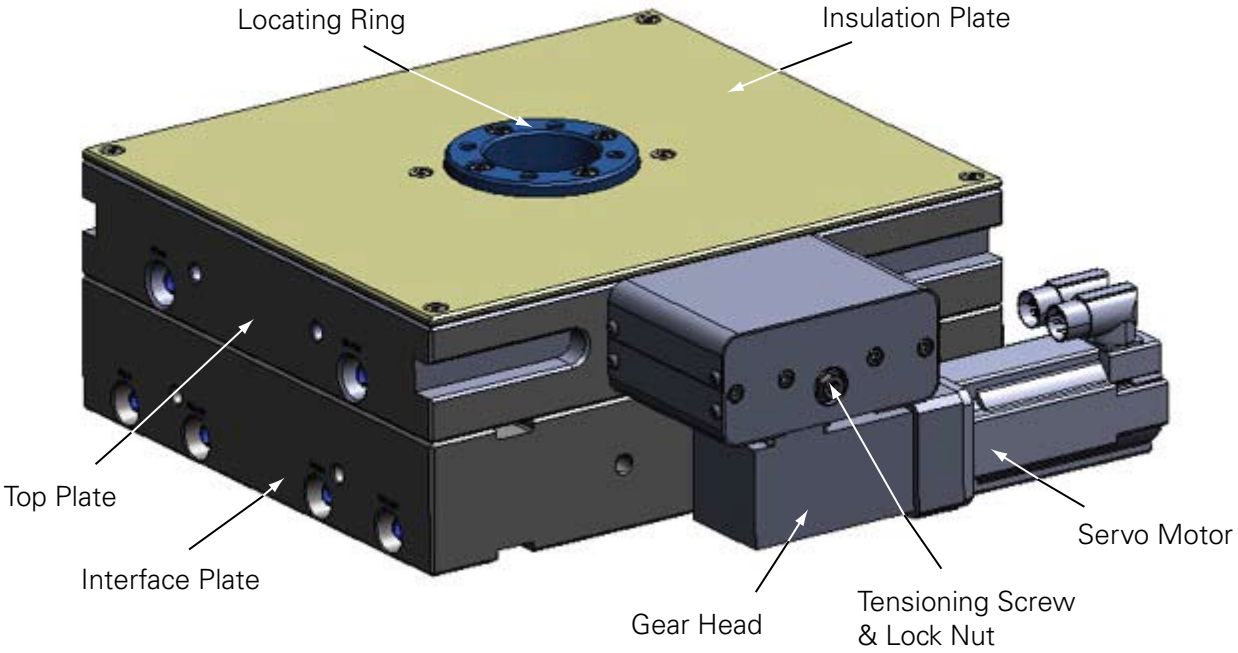
1. Disassemble the system.
2. Wipe down nozzle body.
3. Remove the part and wipe clean.
4. If necessary, use a cotton swab to clean narrow interior surfaces or screw threads. For larger surfaces, such as mold plates use thinner in spray form to clean channels and recesses.

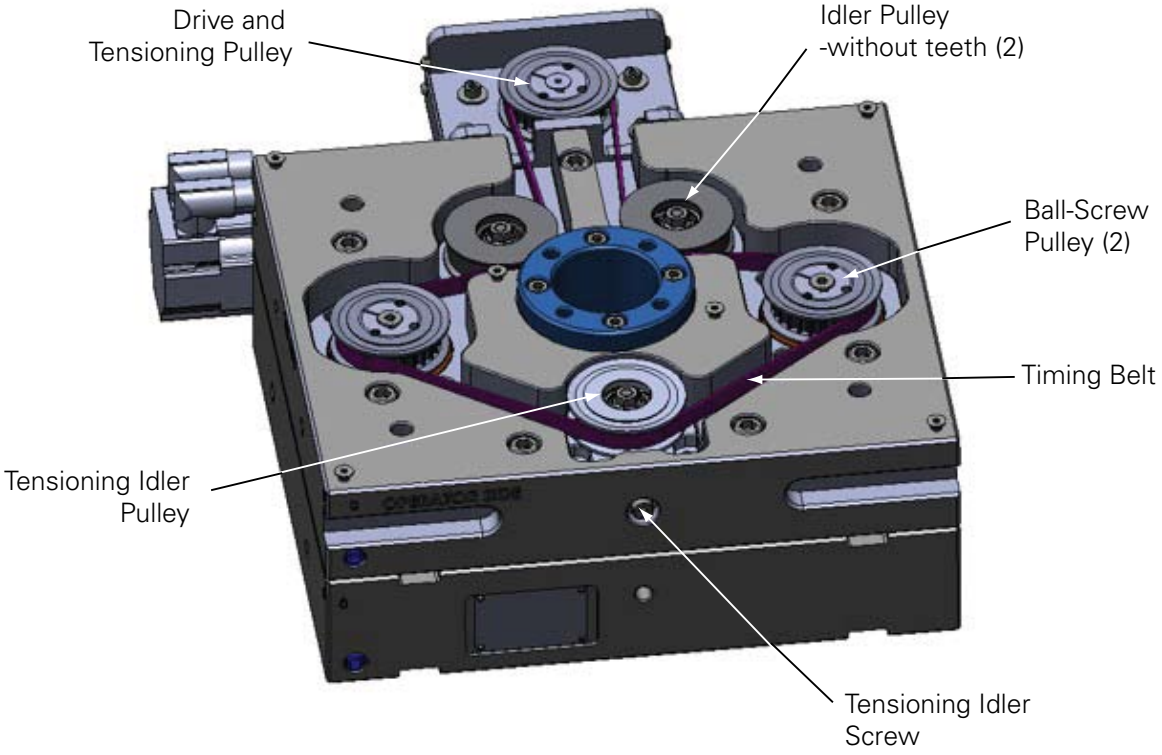
Establishing Your System Type

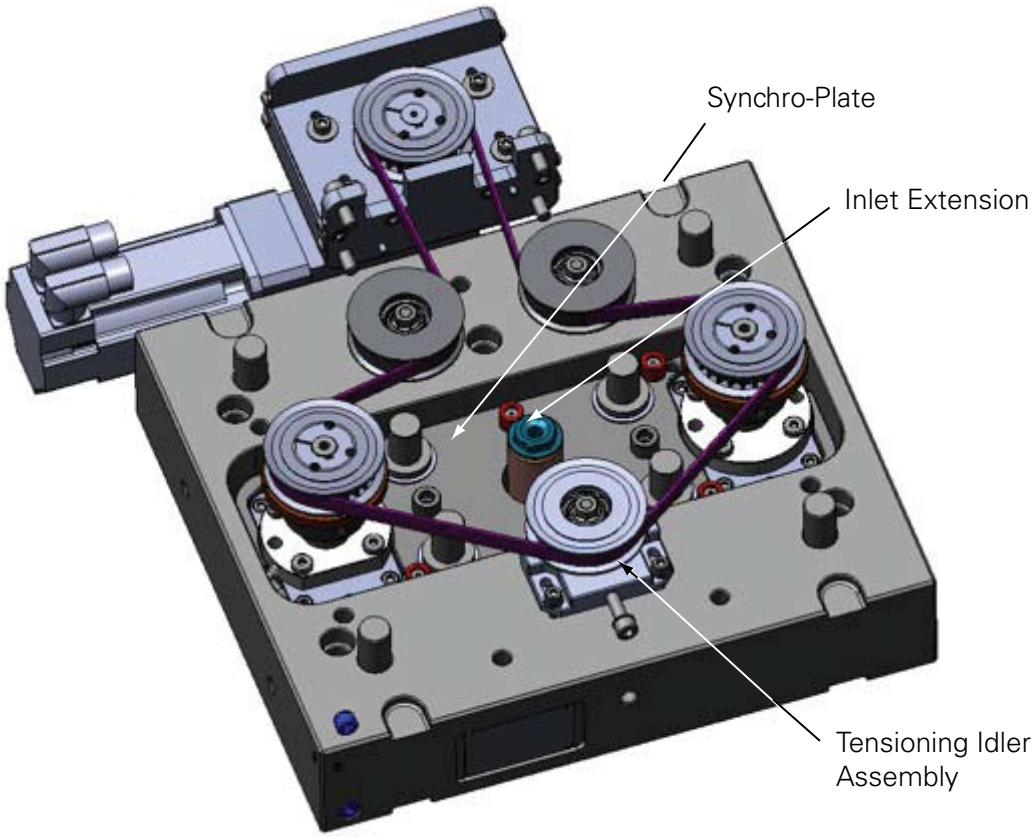
The following pages are to be used as a general guide to assist in identifying components. Refer to your general assembly drawings for specific component lists.

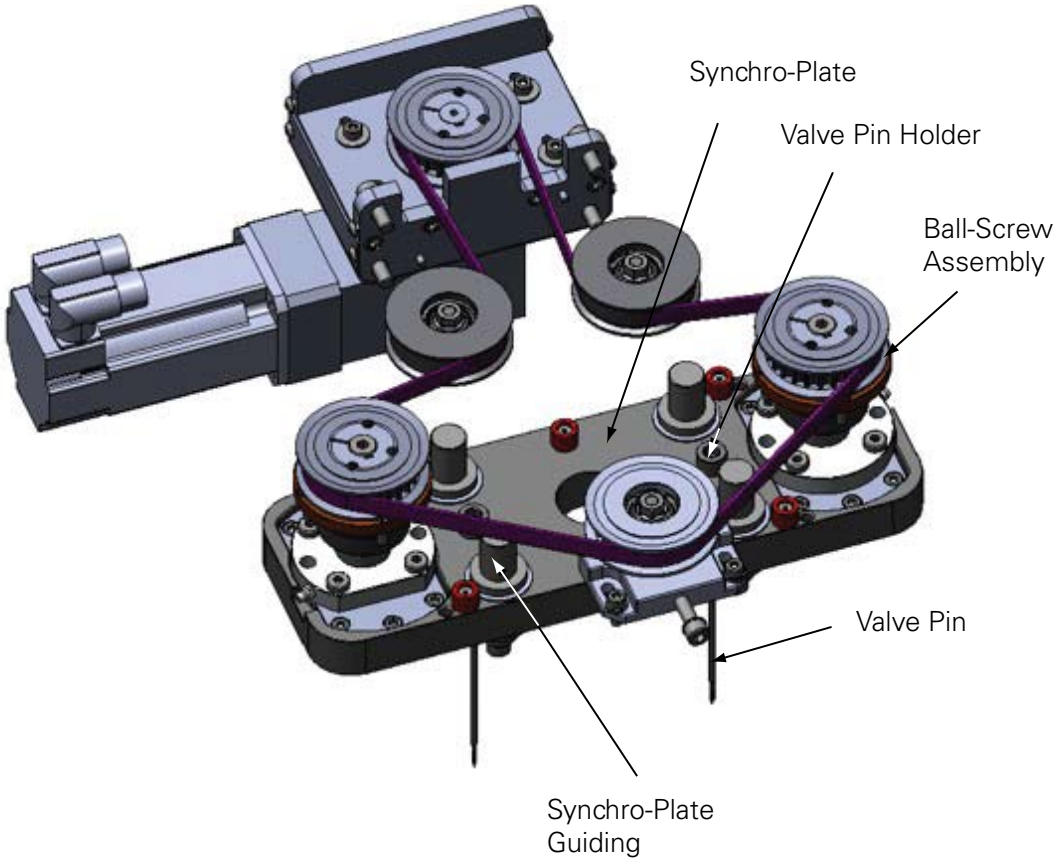
©09-2010 Mold Masters

Typical *E-Drive* System



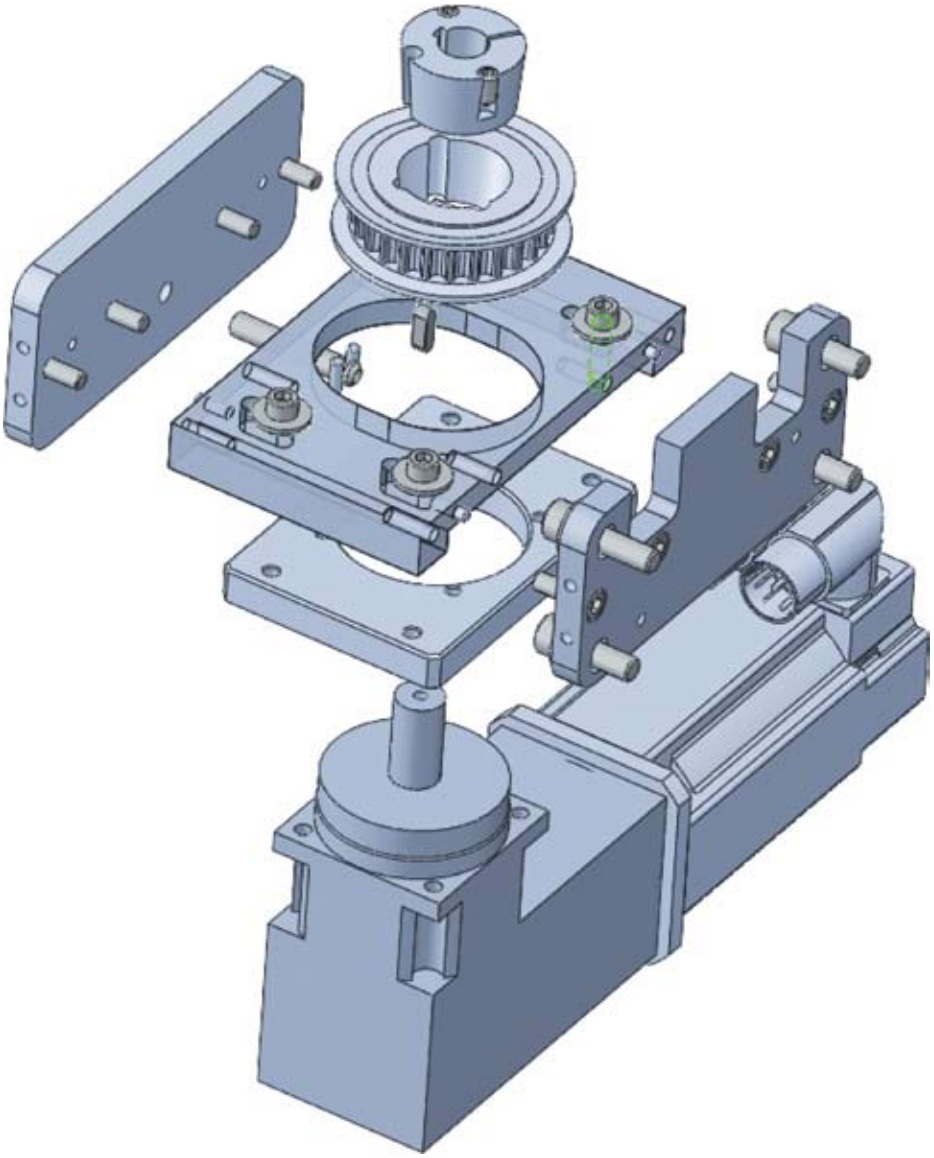




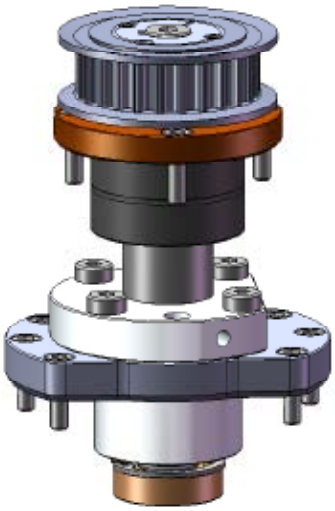


©09-2010 Mold Masters

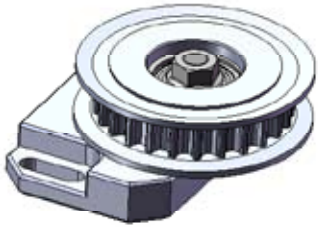
E-Drive Components



E-Drive Motor Mount - exploded view



Ball-Screw Assembly



Tensioning Idler Assembly

Fix Idler (without teeth)

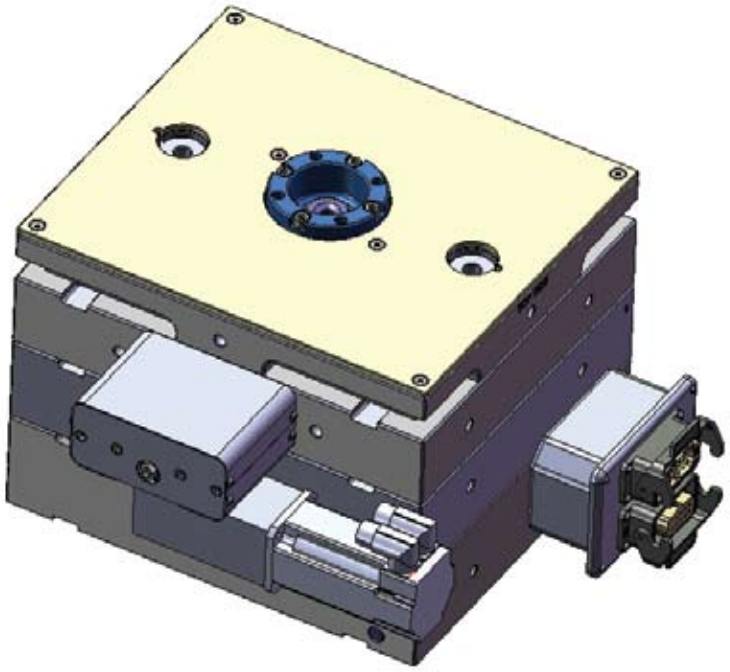
©09-2010 Mold Masters

Section 5 - Assembly

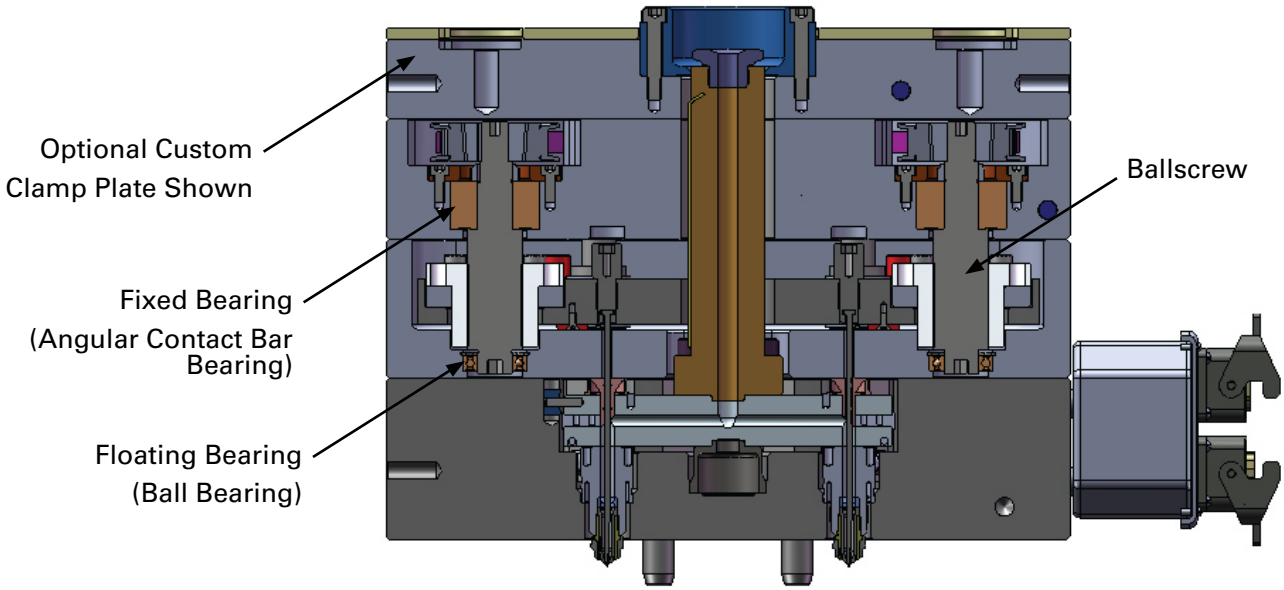
Introduction

Your *Mold-Masters E-Drive* system is shipped pre-assembled and requires minimal pre-installation assembly. The following details the assembly/installation procedures for various components of the *E-Drive*.

Complete Assembly (3D View)



Complete Assembly (Center Section)



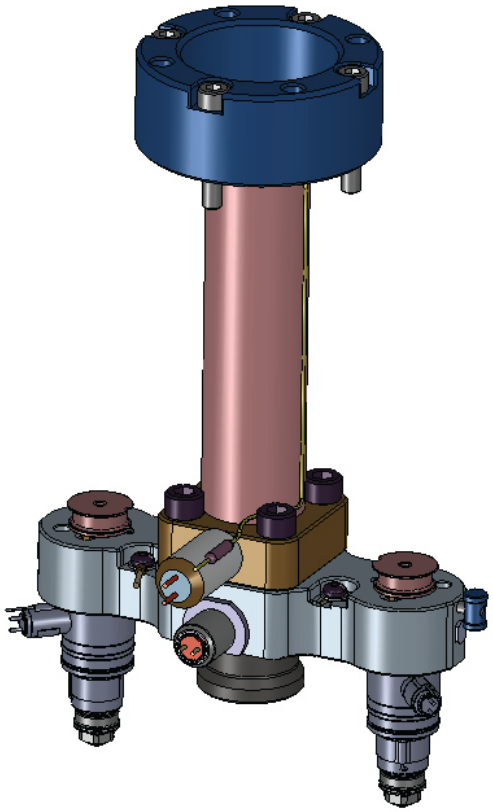
©09-2010 Mold Masters

Assembly Summary

1. Assemble the hot runner system.
2. Assemble the hot runner system to manifold plate.
3. Assemble the interface plate.
4. Assemble the synchro-plate.
5. Drop the synchro-plate to place.
6. Assemble the valve pin holders.
7. Assemble all top plate items (ball-screw assembly needs to be filled with proper grease before shipping, see "Lubrication of Ball-Screw Assembly").
8. Prepare top plate assembly before lowering.
9. Attach the synchro-plate to top plate assembly.
10. Tighten the belt (if first time installation of belt or replacing belt, refer to “replace The Belt Or First Time Installation of the Belt”).
11. Inspect parallelism of the synchro-plate.
12. Assemble the special clamping plate (if exists).
13. Assemble the insulation plate & locating ring.
14. *E-Drive* controller checks.
15. Preparation for shipping.

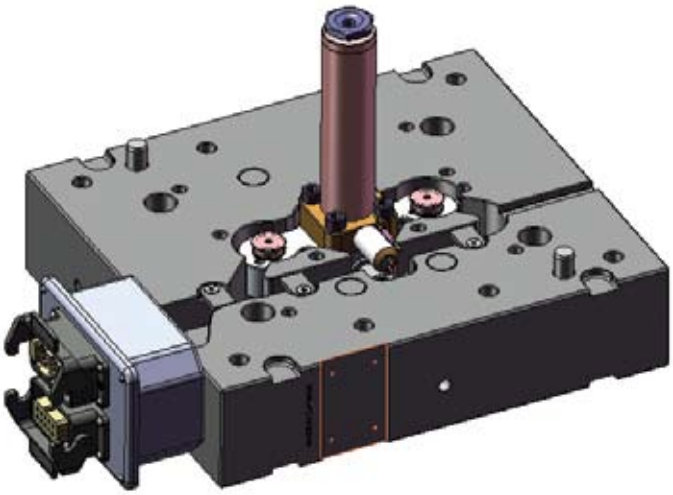
Assembly Details

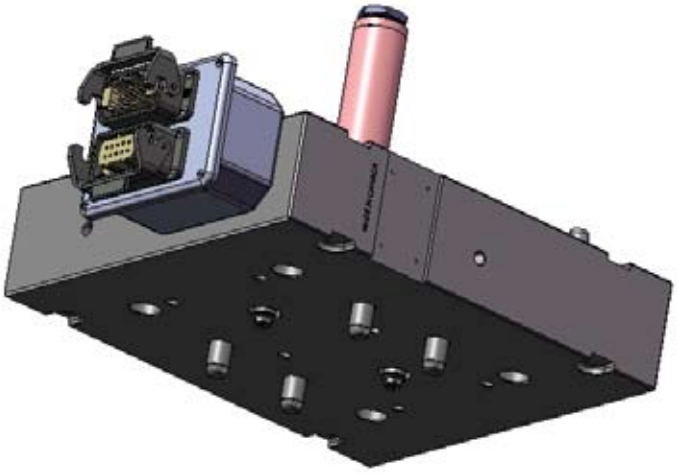
1. Assemble the hot runner system.



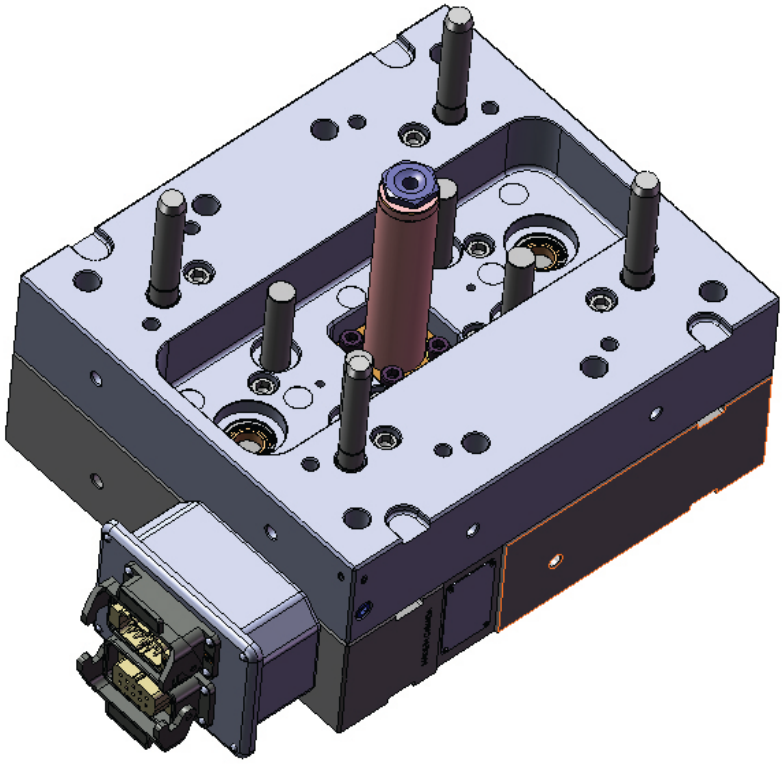
©09-2010 Mold Masters

2. Assemble the hot runner system to manifold plate.

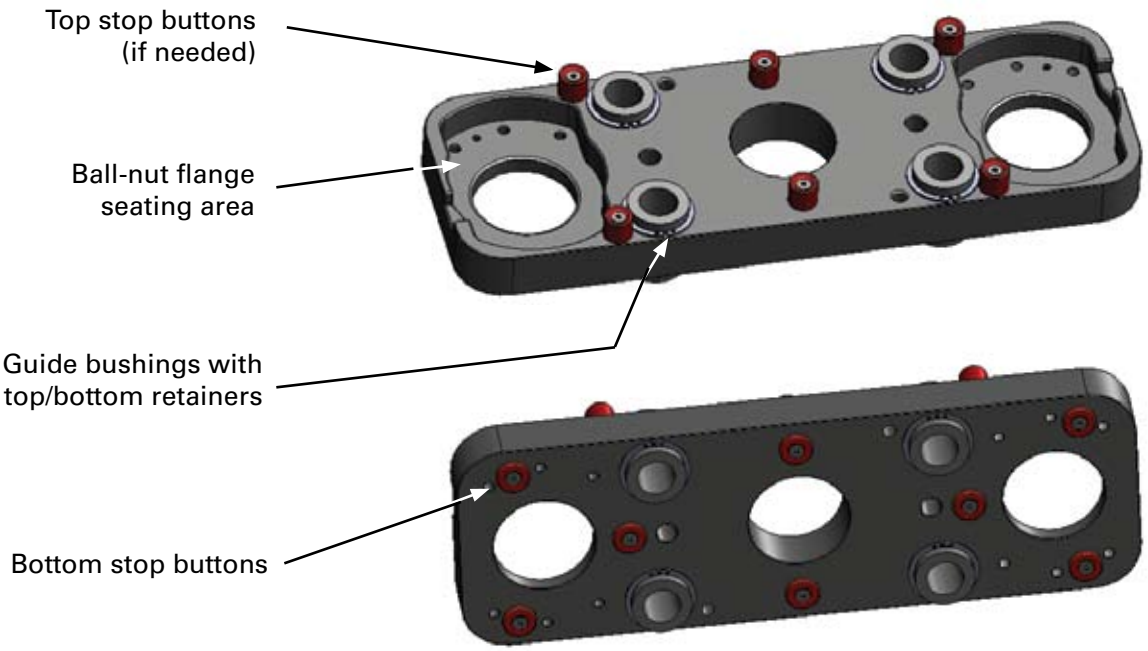




3. Assemble the interface plate:
   - Main leader pins.
   - Synchro-plate leader pins.
   - Bearing and retainers.
   - Fastening screws between plates.

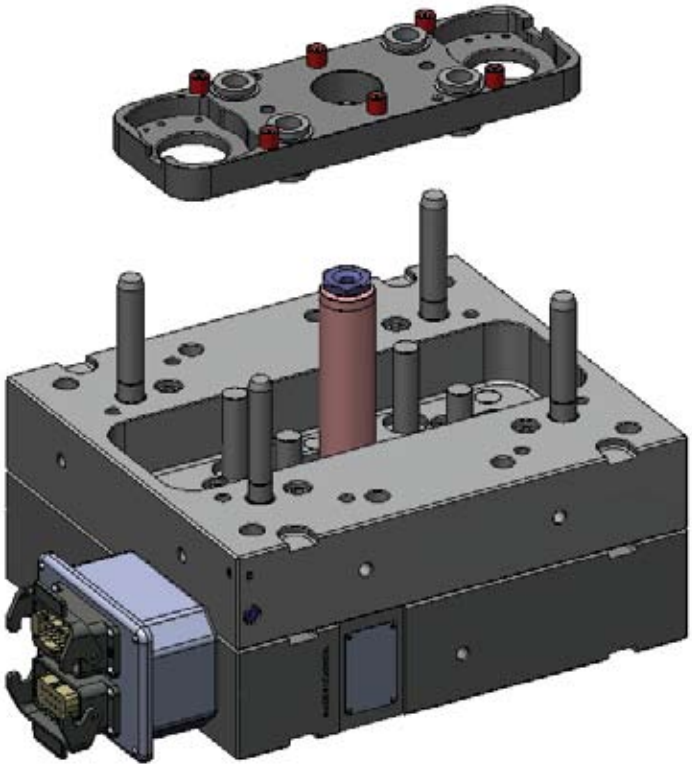


4. Assemble the synchro-plate (without ball-nut).



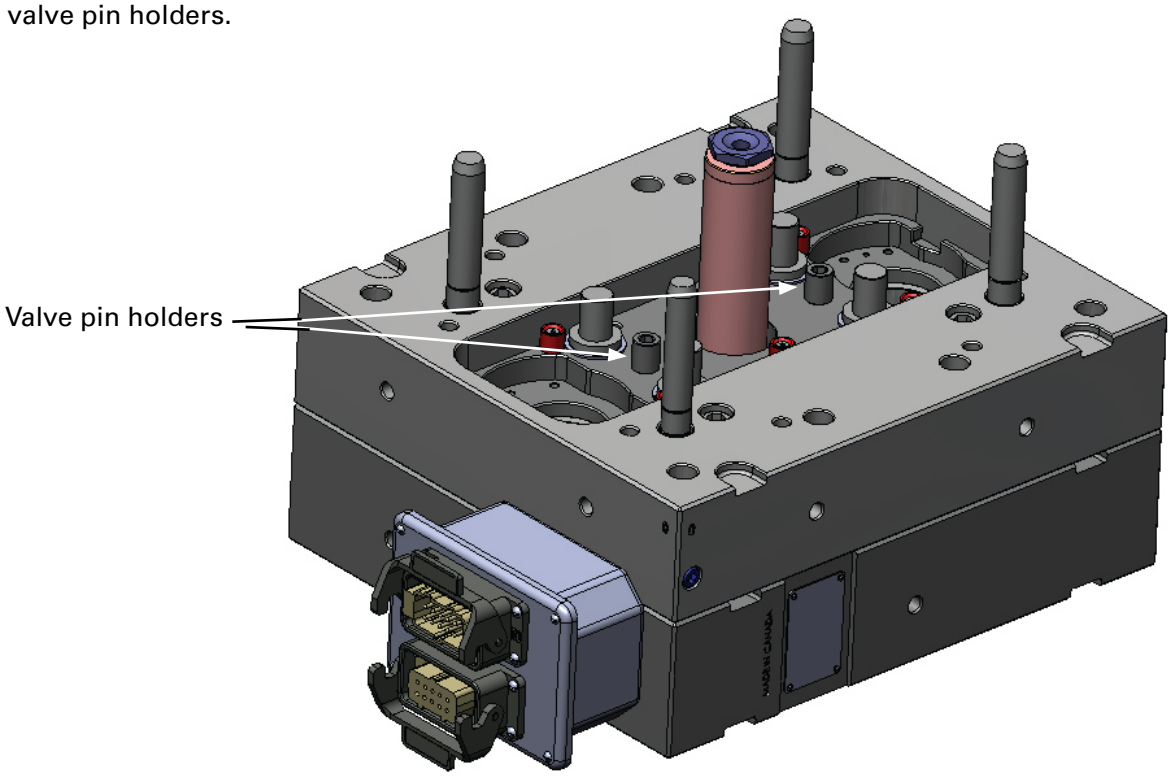
5. Drop the synchro-plate into place.

   Check for smooth up/down movement of synchro-plate



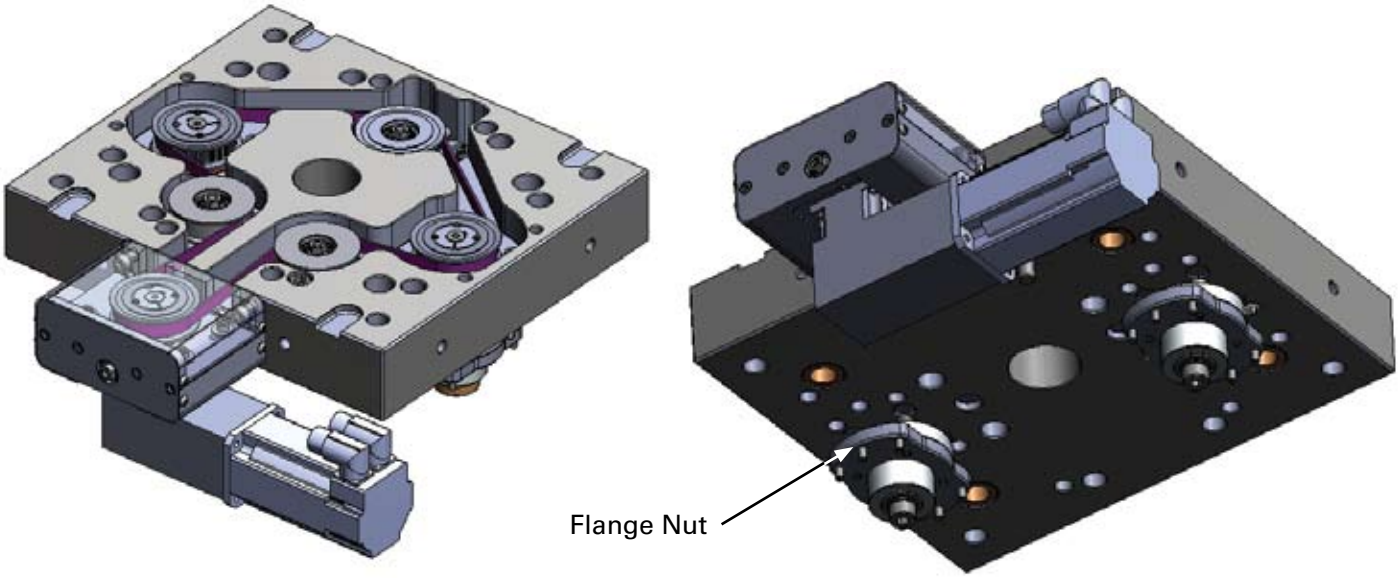
©09-2010 Mold Masters

6. Assemble the valve pin holders.



7. Assemble all top plate items (details follow).

   Assemble the ball-screw assemblies, pulley assemblies, motor mount assembly, guide bushes and belt (release tension from belt).



7.1 Prepare the ball-screw.

7.1.1 Assemble the ball-screw and fixed bearing.

7.1.2 Torque the ball-screw nut (M20 x 1.0) to 19Nm (14 Ft-lb).

7.1.3 Make sure the bearing is seating properly in place.

7.2 Assemble the ball-screw to the top plate.

7.2.1 Check dimension of fixed bearing bores in top plate before assembly.

7.2.2 Insert the ball-screw and fixed bearing into top plate (press-fit). Bearing will protrude 0.10mm to get loaded by the cover.

©09-2010 Mold Masters

7.3 Fasten cover plate into position.

7.4 Assemble ball-nut on ball-screw.

7.4.1 Note: do not disassemble the arbor from ball-nut before getting ready for assembling it into the ball-screw.

7.4.2 Ball-screw mounting kit is standardized as EDRIVEBSMNT-KITP and is supplied with the system.

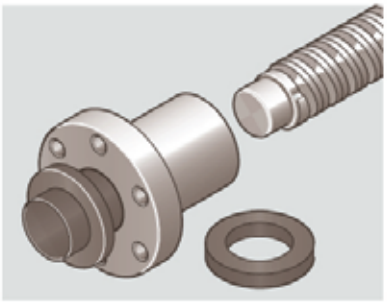
Note: arbor needs to be placed properly against ball-screw when rotating the ball-screw. Failure to do so may result in balls falling out of assembly. It would be very difficult to reassemble the balls and unit may have to be scrapped.

7.4.4 Keep the arbor and rubber rings in a safe place. You will need them for disassembly of the ball-screw from ball-nut.

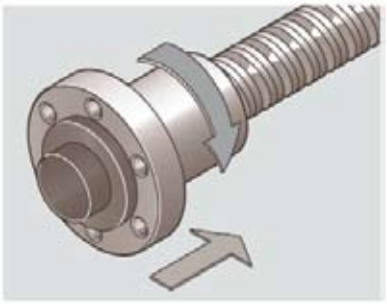
©09-2010 Mold Masters

7.5 Assemble ball-screw and ball-nut.

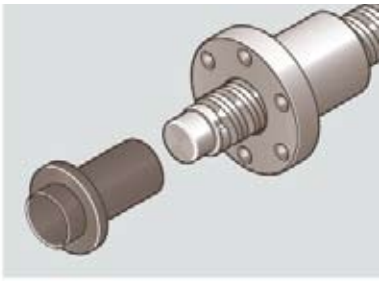
7.5.1 The nut is to be mounted as follows:
Remove the rubber ring from one end of the mounting arbor.
Push the mounting arbor with nut until it bears against the end of the thread. The arbor must make contact with no axial clearance.



7.5.2 Carefully turn the nut unit onto the thread, applying only slight thrust.



7.5.3 Remove the arbor only when the nut unit is fully located on the screw thread.

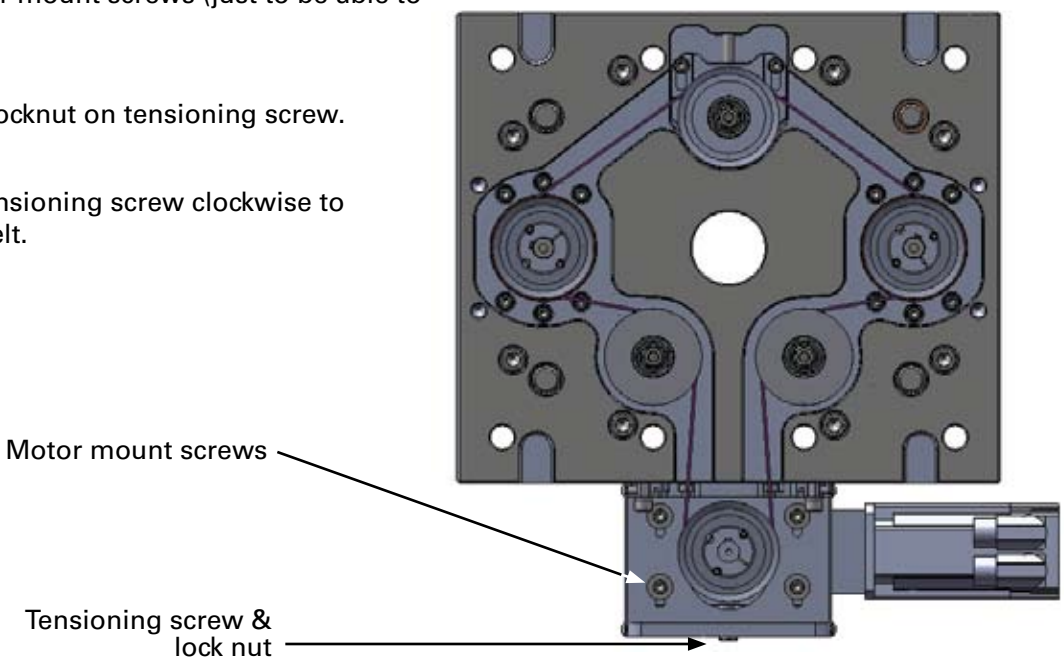


7.6 Release the tension of the belt.

7.6.1 Loosen motor mount screws (just to be able to slide it).

7.6.2 Release the locknut on tensioning screw.

7.6.3 Rotate the tensioning screw clockwise to loosen the belt.

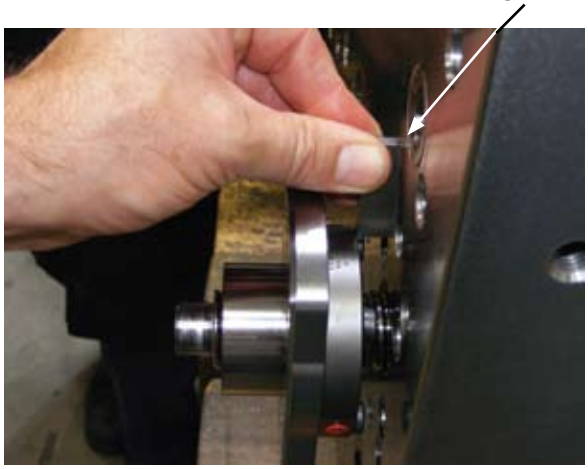


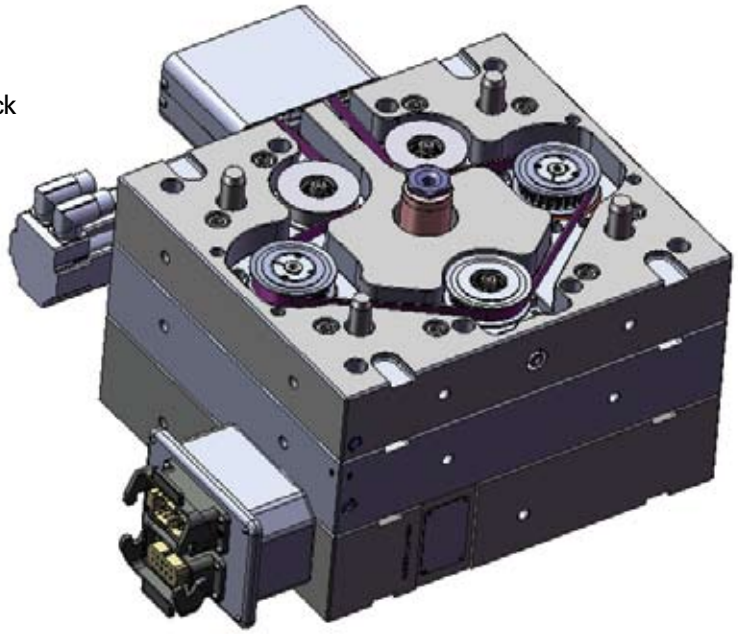
8. Prepare top plate assembly before lowering.

   8.1 Belt should be loose / tension free.

   8.2 Both flange-nuts should be at proper orientation and same level before top-plate is lowered down for assembly.

Gauge Block

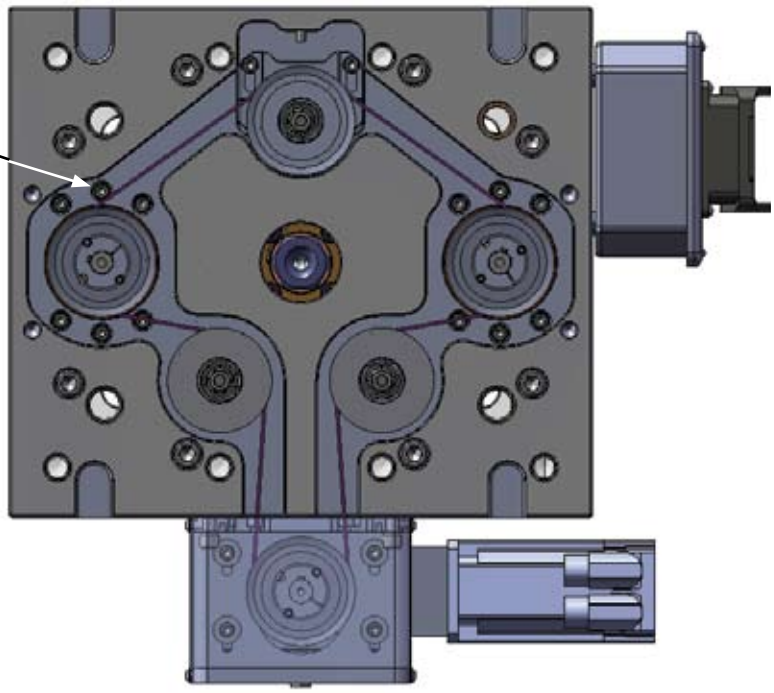




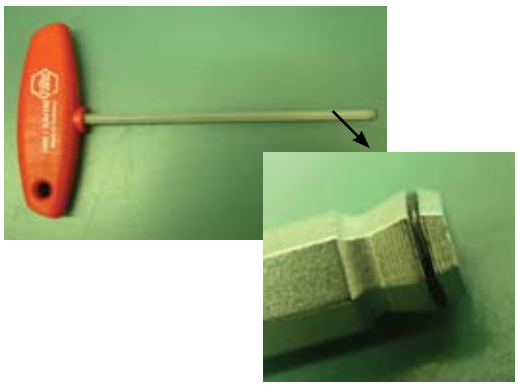
9. Attach the synchro-plate to top plate assembly.

   Using tool KEY-BPHEXTKEY5.0, place the M6 screws that connect the ball-nut flange to the synchro-plate and then slightly tighten them. Use another hex key tool with stronger tip to fully tighten the screws.

Tighten 12 screws evenly in both sides (Note: belt must be without tension)

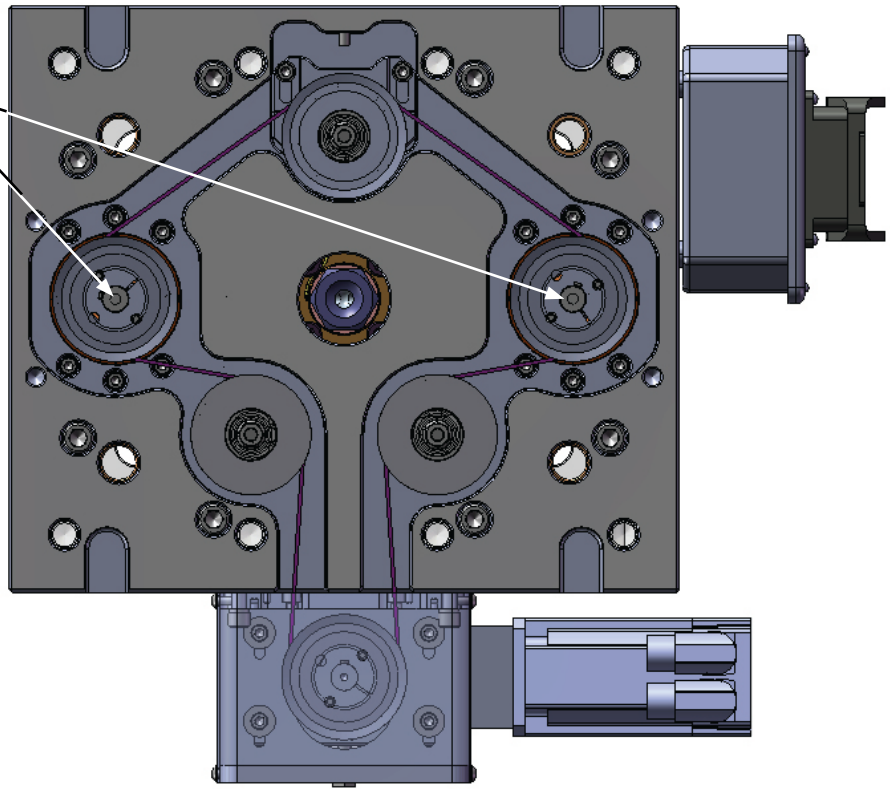


Tool KEY-BPHEXTKEY5.0



Not under documentation control if printed. May be revised without notice
Electronic version is available at www.moldmasters.com
©09-2010 Mold Masters

9.1 With the belt still loose, evenly rotate both ball-screws clockwise until the synchro-plate hits the top stop buttons and is level on each side.



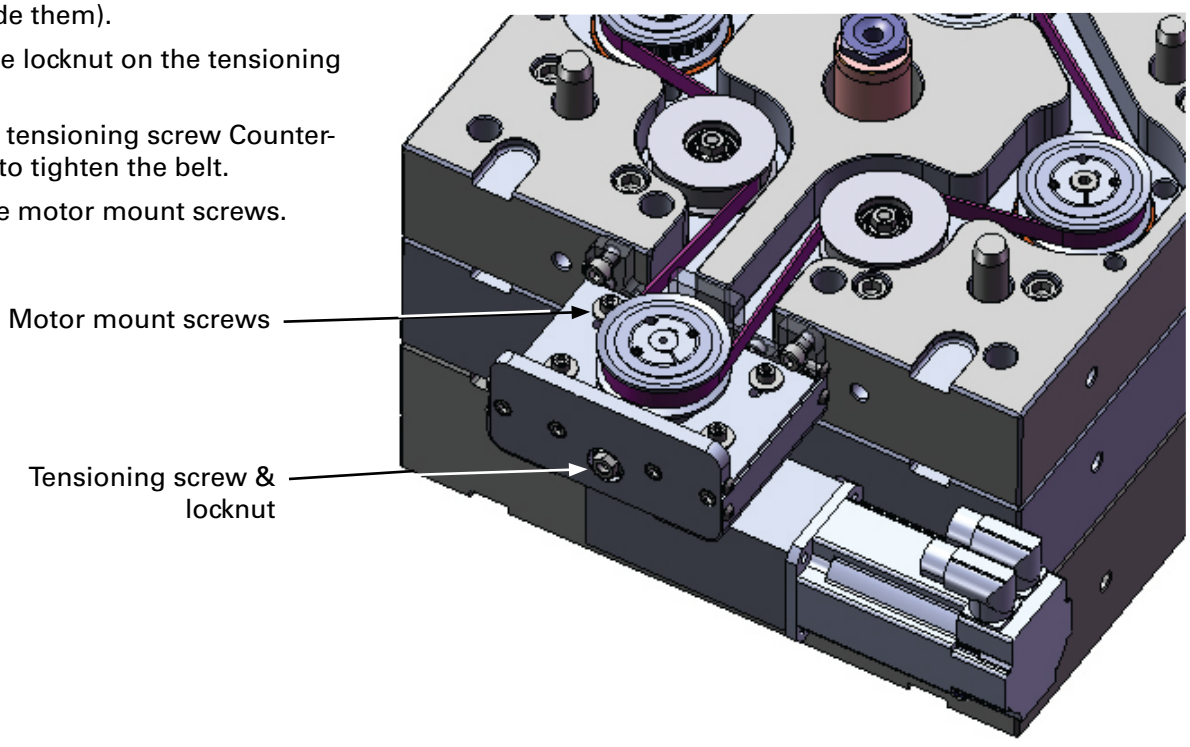
10. Tighten the belt.

10.1 Loosen motor mount screws (just to be able to slide them).

10.2 Release the locknut on the tensioning screw.

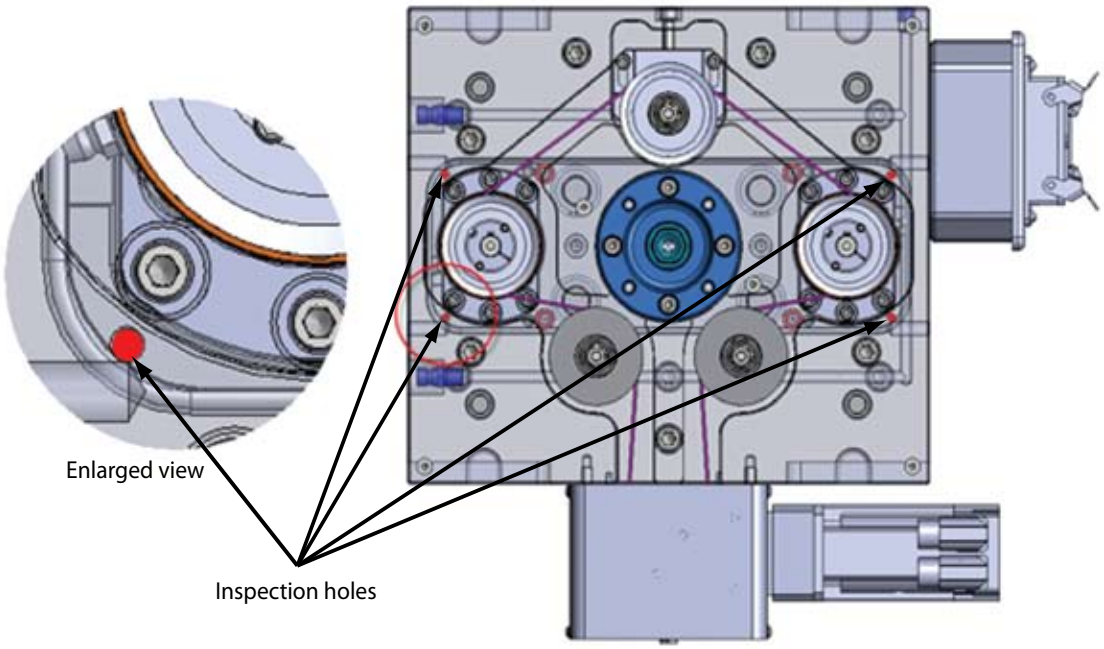
10.3 Rotate the tensioning screw Counter-clockwise to tighten the belt.

10.4 Tighten the motor mount screws.

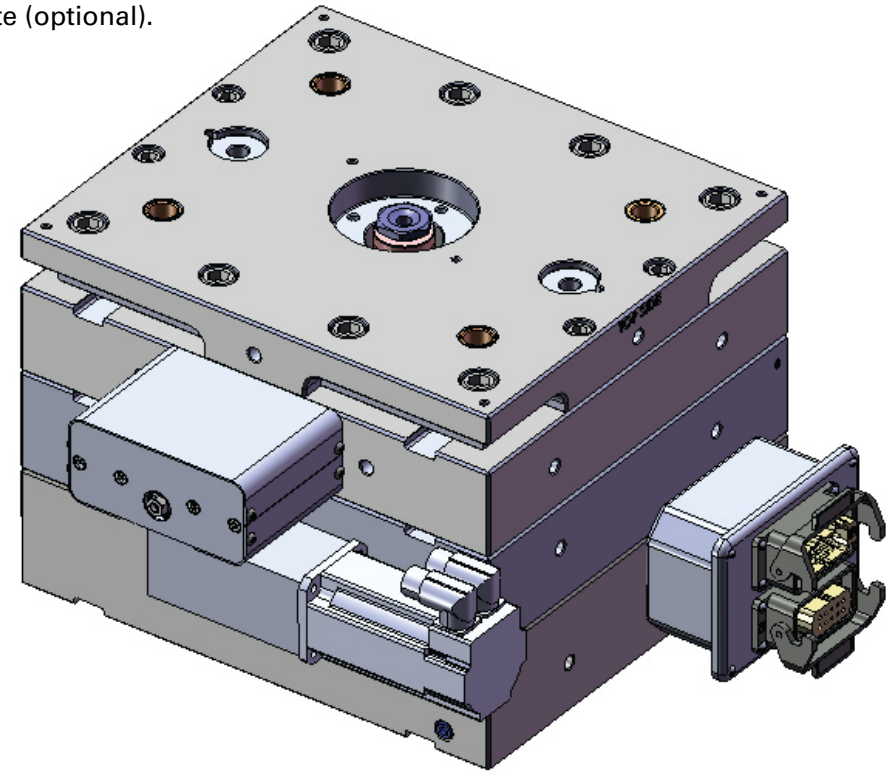


©09-2010 Mold Masters

11. Inspect parallelism of the synchro-plate.
    If holes for inspection of synchro-plate are provided, check parallelism of the synchro-plate with proper depth gauge tools.

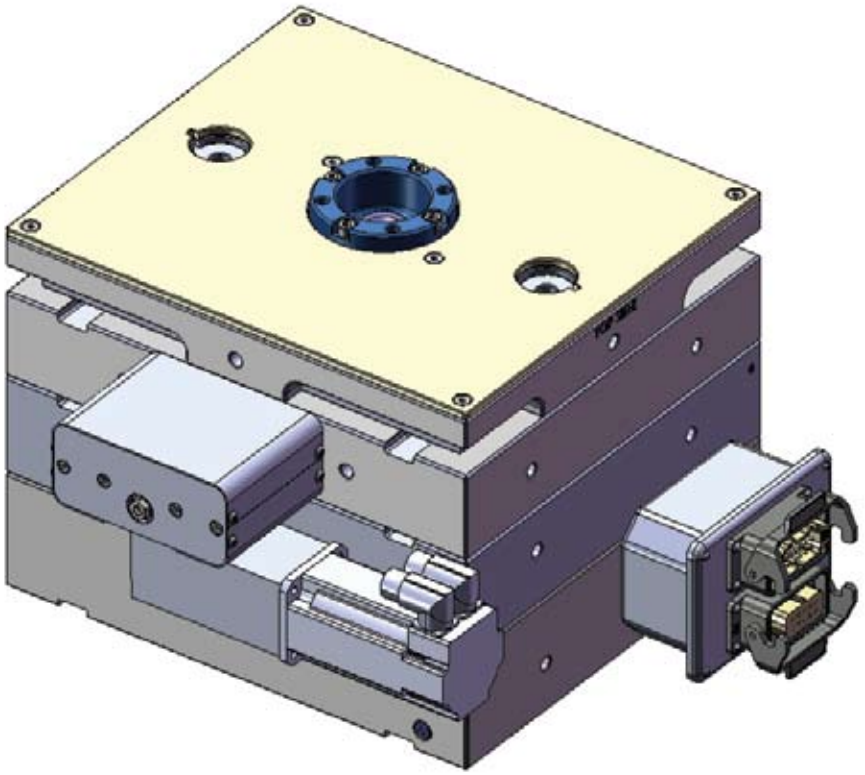


12. Assemble the special clamping plate (optional).



©09-2010

13. Assemble the insulation plate and locating ring.



14. Perform *E-Drive* Controller Checks.
Before startup of the system, read "*E-Drive* Controller Operating Manual".

CAUTION
Do not swap *E-Drive* Controllers for different *E-Drive* systems without checking manual as controller setup must match mechanical system.

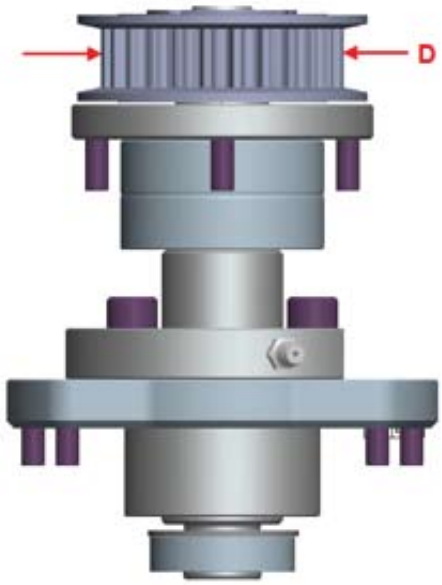
14.1 Check MODE OF OPERATION (See *E-Drive* Controller Operating Manual).

- If *E-Drive* system is designed to have the synchro-plate bottoming at a hard stop at close position of valve pins, *E-Drive* controller mode of operation should be "EndStop Mode".
- If *E-Drive* system is designed to have the valve pins closing position set within a certain range (usually +/- 0.3mm), *E-Drive* controller mode of operation should be "RefPinPosition Mode".

©09-2010 Mold Masters

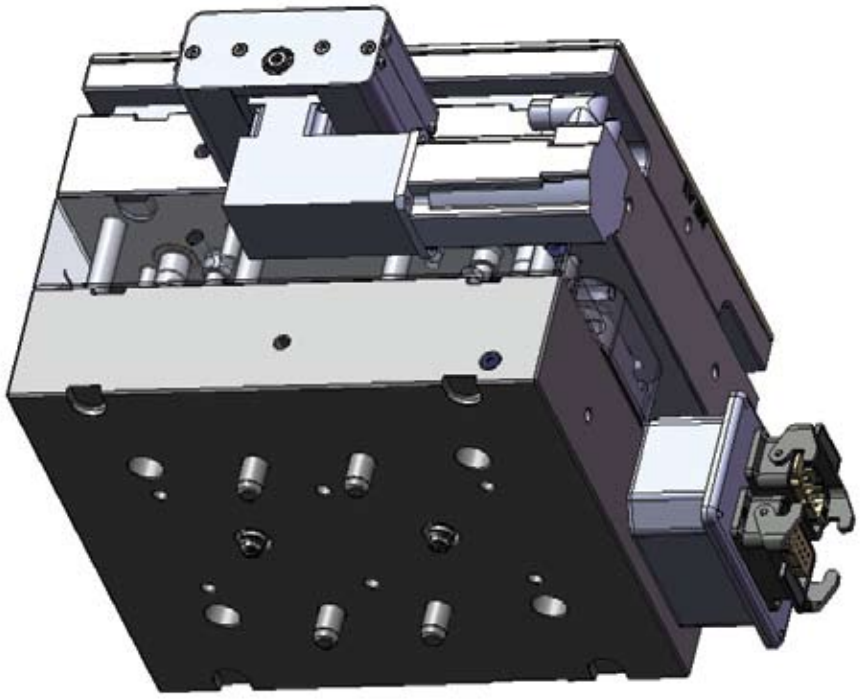
14.2 Check MECHANICAL FACTOR (See *E-Drive* Controller Operating Manual).

- If Ball-screw assembly package name is "EDRIVEBSASM01", then Mechanical Gearing Factor needs to be set to 1.0 (hint: In such cases, shown diameter of the top pulley is D=62mm or 2.45").
- If Ball-screw assembly package name is "EDRIVEBSASM02", then Mechanical Gearing Factor needs to be set to 1.2 (hint: In such cases, shown diameter of the top pulley is D=75mm or 2.95")



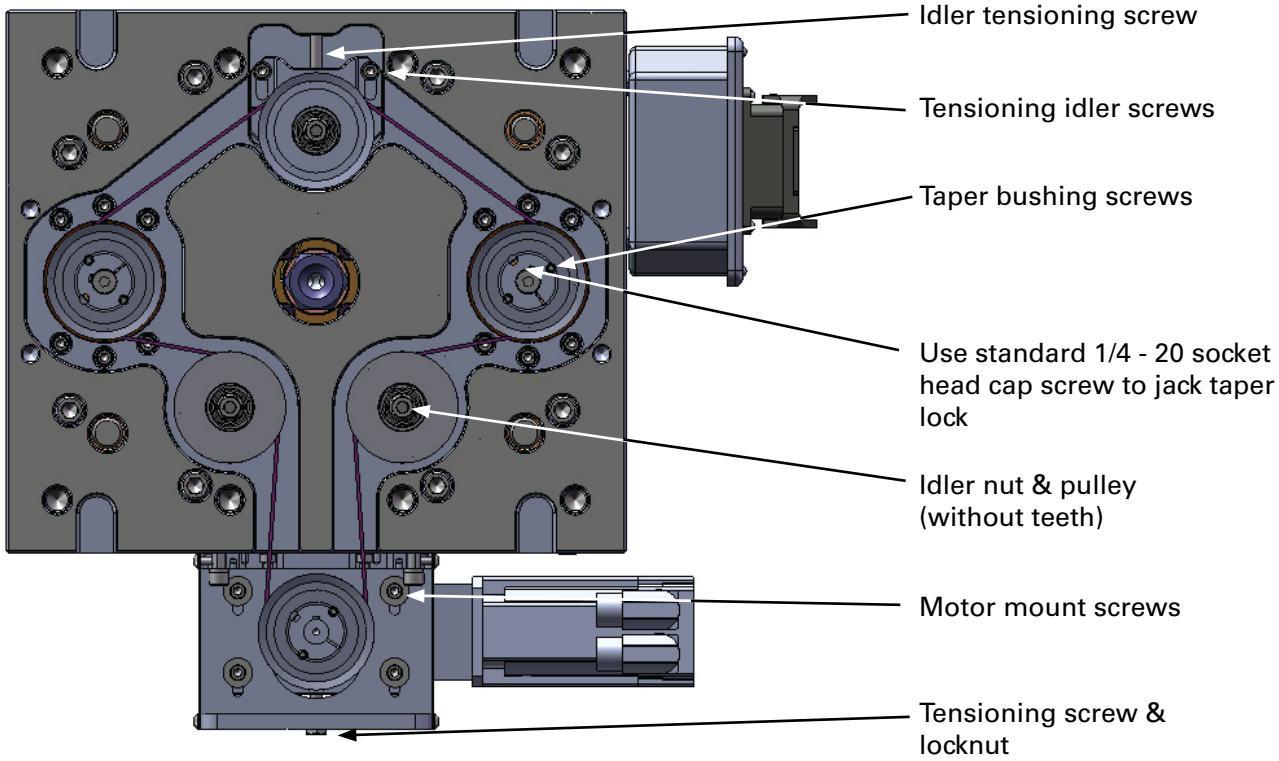
15. The hot half is now ready to be installed into the mold.

NOTE
Make sure the synchro-plate valve pins are at the open position before shipping.



First Time Installation or Replacement of the Belt

1. If system is new and no plastic is inside, move the synchro-plate to home position (fully open position). With proper hex keys on top of ball-screws, rotate clockwise. If system has run plastic before, make sure you heat up the system before moving the synchro-plate to fully open position. In such case, attach cooling lines to cooling system and make sure that Mold-Temperature will not exceed 70°C (158°F) for *E-Drive* plates.
2. Remove tension from belt completely from both sides (motor mount & tensioning idler).
3. Loosen nuts above one idler without teeth and remove the idler pulley (to allow inserting the belt in tight-belt conditions).
4. Remove the taper bushing set screws on top of both ball-screw pulleys (1/4-20 UNC). NOTE: use another standard ¼-20 socket head cap screw to jack the pulley until it releases (make sure synchro-plate remains all the way up and seated flat).
5. Replace the belt.
6. Put back the idler without teeth and tighten the nuts.
7. Install the taper bushing allowing the pulley to still rotate (not gripping yet).
8. Apply slight tension to engage two pulleys (check elevation of pulleys).
9. Time both ball-screw pulleys to engage in same way.
10. Tighten the taper bushing set screws on top of ball-screw pulleys (make sure the pulleys are at proper elevation and synchro-plate remains flat and seated).
11. Apply proper tension to belt.
12. Tighten the motor mount screws.
13. Tighten the locknut on tensioning pulley.
14. Check belt height all around and make sure it is in middle of all pulleys and not rubbing on sides (measure depth of belt at various places, and check alignments).
15. If possible, while system is heated, do a few dry cycles (using 24 VDC manual trigger) and check movement and noise. Double check the position of belt within all pulleys. See *E-Drive* Controller Operating Manual.

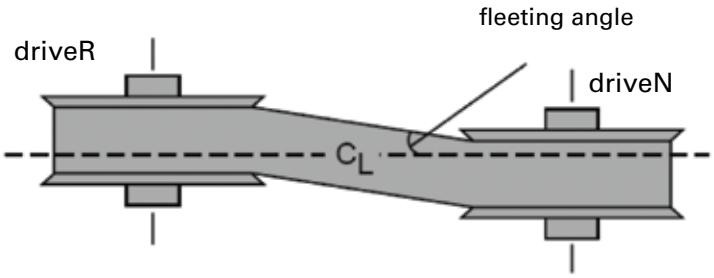

Idler tensioning screw
Tensioning idler screws
Taper bushing screws
Use standard 1/4 - 20 socket head cap screw to jack taper lock
Idler nut & pulley (without teeth)
Motor mount screws
Tensioning screw & locknut

©09-2010 Mold Masters

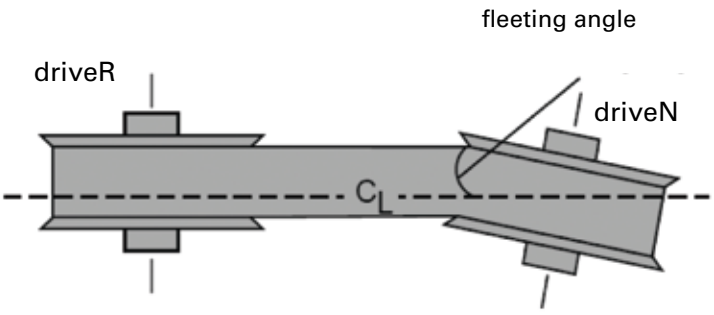
Checking for Misalignment

1. During belt installation and drive alignment, two types of misalignment can occur:
   - Parallel misalignment - is when driveR and driveN shafts are parallel, but the two pulleys lie in different planes.
   - Angular misalignment - is when the two shafts are not parallel.
2. A fleeting angle is the angle at which the belt enters and exits the pulleys, and equals the sum of the parallel and angular misalignments.
3. Any degree of pulley misalignment will result in some reduction of belt life, which is not accounted for in the normal drive design procedure. Misalignment of all positive belt drives should not exceed 1/4˚ or 5 mm per metre of centre distance.
4. Misalignment should be checked with a good straight edge tool. The tool should be applied from driveR to driveN and from driveN to driveR so that the effect of parallel and angular misalignment is taken into account.

Parallel Misalignment



Angular Misalignment

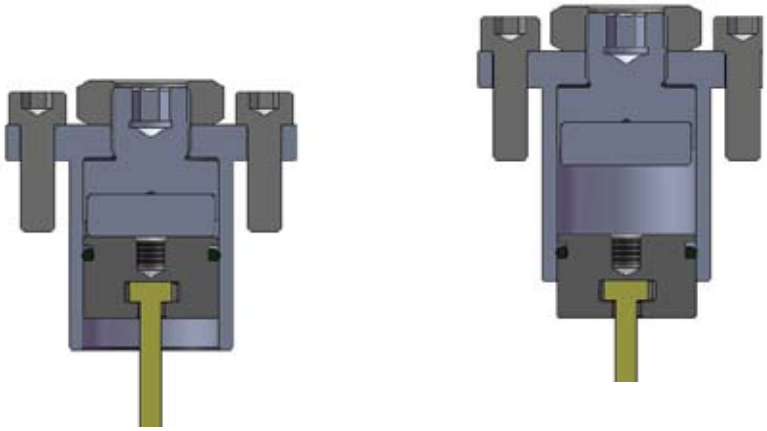


©09-2010 Mold Masters

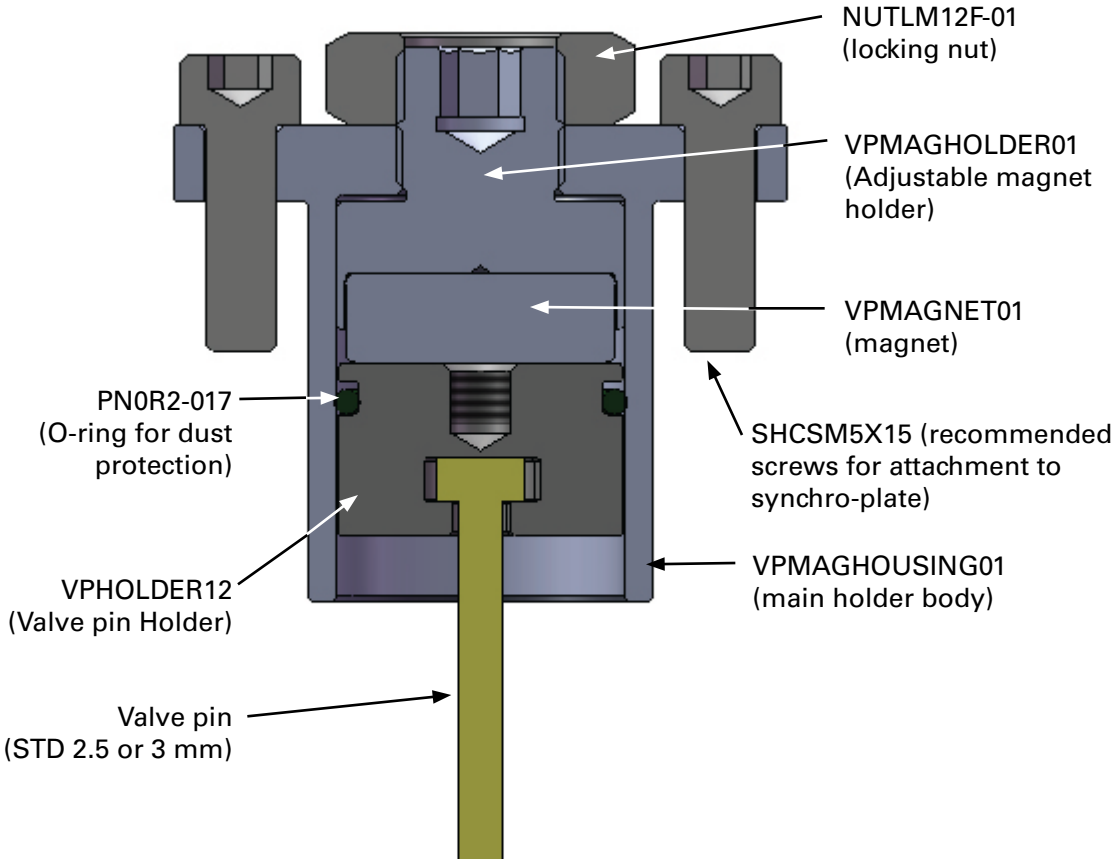
Section 6 - *Mag-Pin* Option

Introduction

The following provides details for the assembly/installation of the *Mag-Pin* (magnetic valve pin holder) which is an optional component of the *E-Drive*. This mechanism allows the deactivation of any individual valve pin in the synchro-plate design at press (without need to open up mold plates). A deactivated valve pin will remain at the closed position. This provides the ability to selectively shut down any cavity in a synchro-plate design.



Mag-Pin Assembly (3D View)



Mag-Pin Application Cautions

This product is not suitable for all material and hot runner applications. Please contact *Mold-Masters* regarding your application.

Factors that need to be considered are:

- Plastic material.
- Nozzle length.
- Valve pin size (only for 2.5 and 3 mm diameter valve pins).
- Gating style

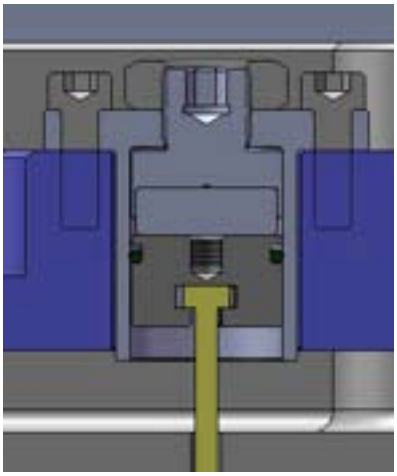
The following conditions are not recommended for *Mag-Pin* application:

- Molding very soft and elastic materials with Durometer Hardness (Style A) less than 90 (especially for very short length nozzles).
- Molding very viscous materials with very long nozzles.
- *Accu-Valve CX* gating style.

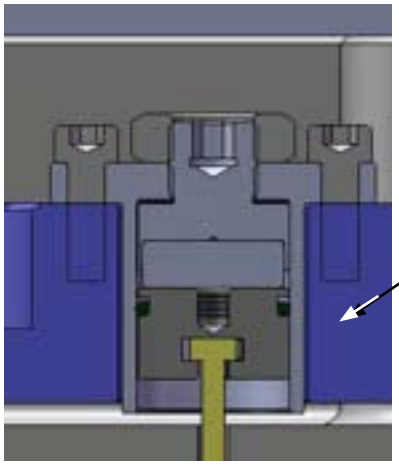
Mag-Pin Activation / Deactivation

Regular operation: Nozzle is at processing temperature and gate is active. Force of magnet is high enough to hold the valve pin attached to synchro-plate during opening cycle.

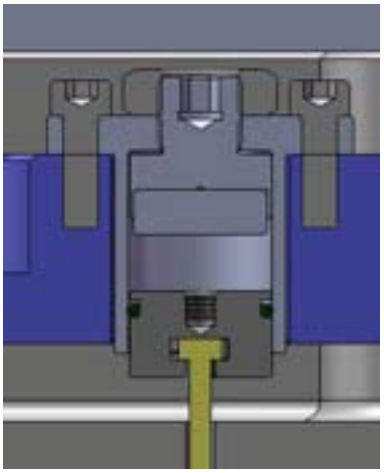
Deactivated gate: Nozzle is turned off and colder plastic all around valve pin holds the pin at close position. Therefore, valve pin can be detached from synchro-plate at magnet interface.



Open Position
(Activated Gate)
(8mm Stroke shown)



Close Position
(Both Activated & Deactivated
conditions)

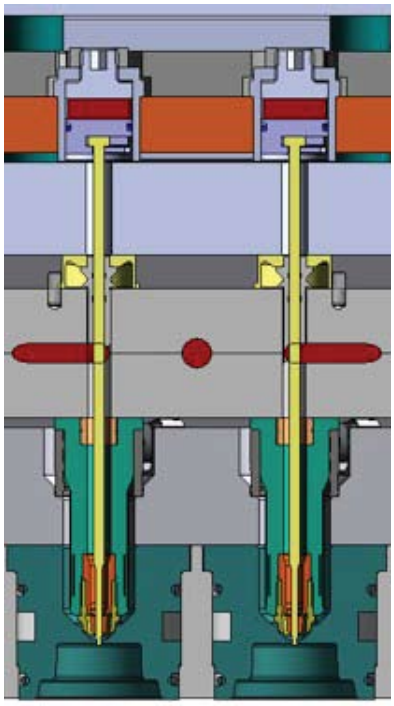


Open Position
(Deactivated Gate)
(8mm Stroke shown)

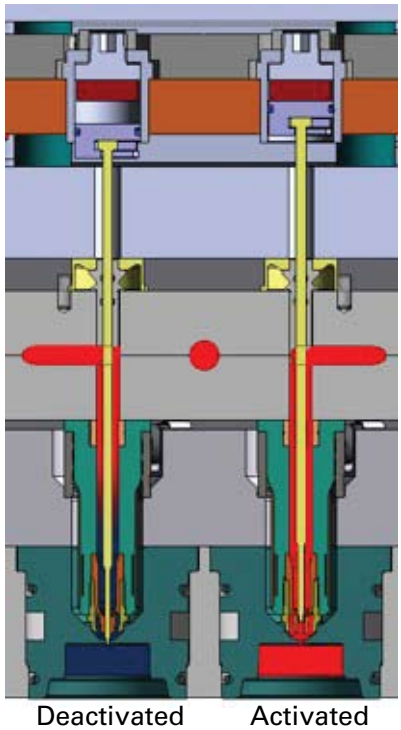
©09-2010 Mold Masters

Deactivation: After turning the nozzle Off (for 5 to 10 minutes, depending on material), plastic material around valve pin holds the pin in place and decoupling happens at magnet interface.

Activation: After turning the nozzle On (for 4 to 8 minutes, depending on material), plastic material around valve pin releases the pin and magnet gets engaged at interface once actuation starts.



Close Position



Deactivated Gate

Activated Gate

Open Position

Handling Magnets

1. Use supplied plastic spacers (MM Part # WASHER37) between magnets to prevent them from colliding with each other while handling and storing.
2. In addition, keep groups of magnets in a thick plastic container to avoid impact with other parts or tools.

WARNING
Be careful of potential pinch hazards when handling the magnets.

Assembly Summary

1. Place the magnet on top of the valve pin holder.
2. Make sure magnet holder is clean.
3. Place the magnet holder on top of the assembly.
4. Detach the valve pin holder from the magnet holder (slide to side).
5. Place the magnet holder and magnet into the housing.
6. Assemble the nut and lock magnet holder.
7. Lubricate O-ring with a thin layer of high temperature grease and place it into the related groove on the valve pin holder. Clean excessive grease from top and side faces..
8. Place the valve pin into valve pin holder slot and then gently place the assembly into the housing assembly. Avoid impact forces on magnet.
9. The *Mag-Pin* is now ready for assembly into the synchro-plate. Heat up the system and complete final valve pin height adjustment if valve pin protrusion is not correct.

Assembly Details

WARNING
Be careful of potential pinch hazards when handling the magnets.

1. Place the magnet on top of the valve pin holder.

CAUTION

Do not start the assembly in a workbench with lots of metal chips and grinding powder. Assembly must be done on a clean workbench. Always use new and clean rags with no metal chips to clean the parts before assembly.

Handle the magnets in a safe and thick plastic container.

Do not place the magnets close to a ferromagnetic part or close to another magnet. Their light weight and high magnetic strength can cause a powerful collision force that may cause the magnet faces to chip or even break due to impact.

©09-2010 Mold Masters

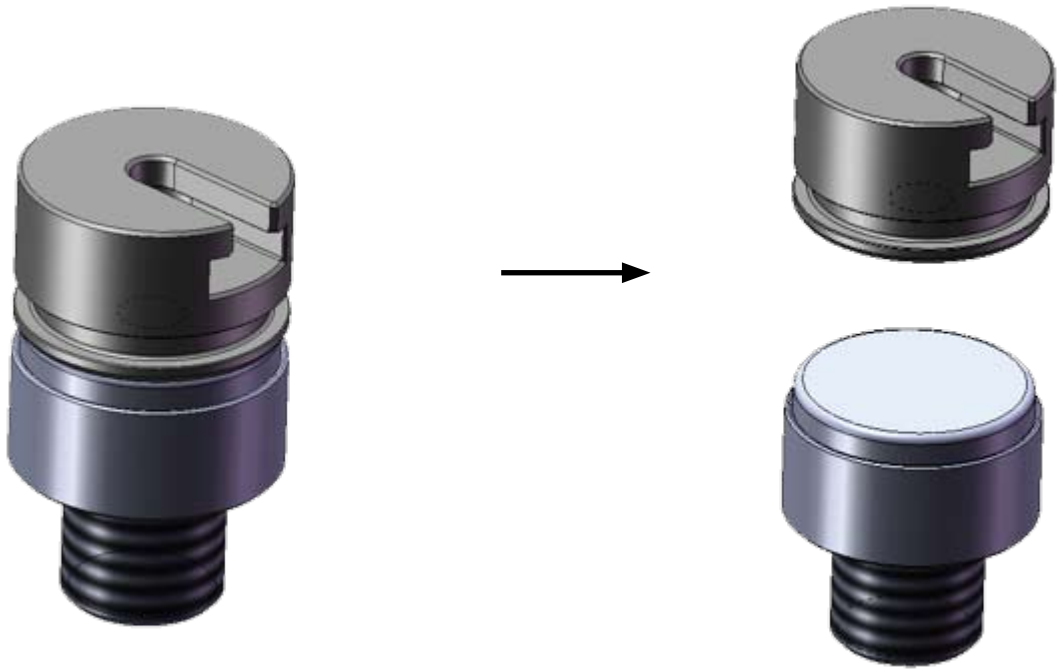
2. Make sure magnet holder (VPMAGHOLDER01) is clean with smooth surface finish at the interface with the magnet.

3. Place the magnet holder on top of the assembly.

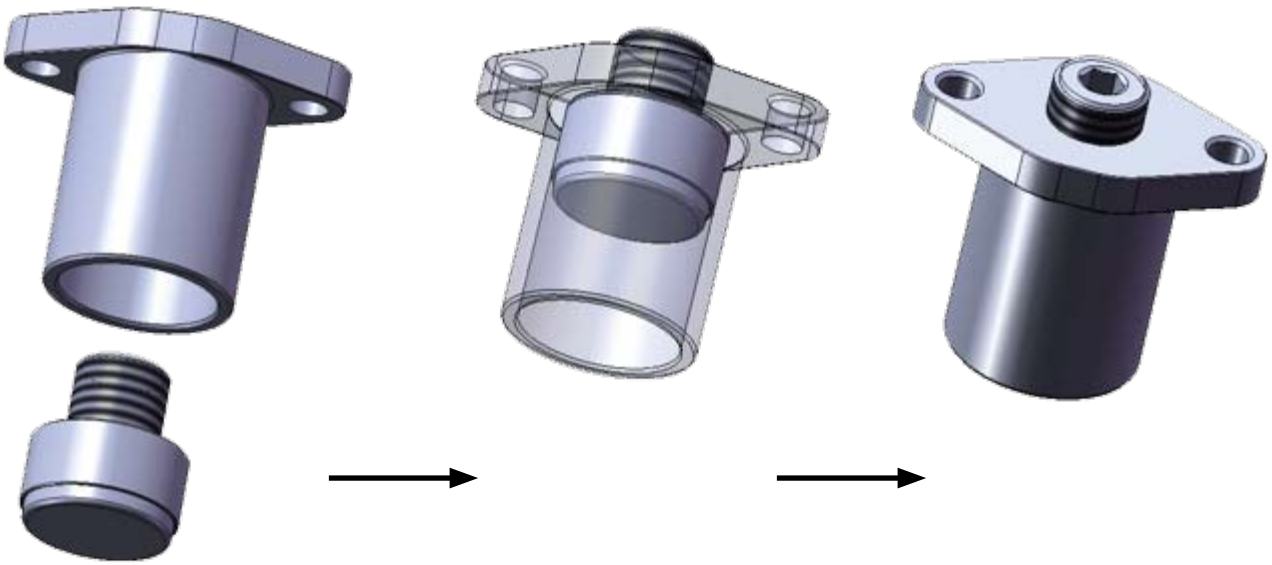
CAUTION

Make sure the surface of the magnet is clean with no oil or grease. This will allow easy assembly of magnet into magnet holder.

4. Detach the valve pin holder from the magnet holder (slide to the side).



5. Place the magnet holder and magnet into housing (VPMAGHOUSING01).
Rotate the magnet holder counter-clockwise with a 5mm hex key until threaded portion protrudes.

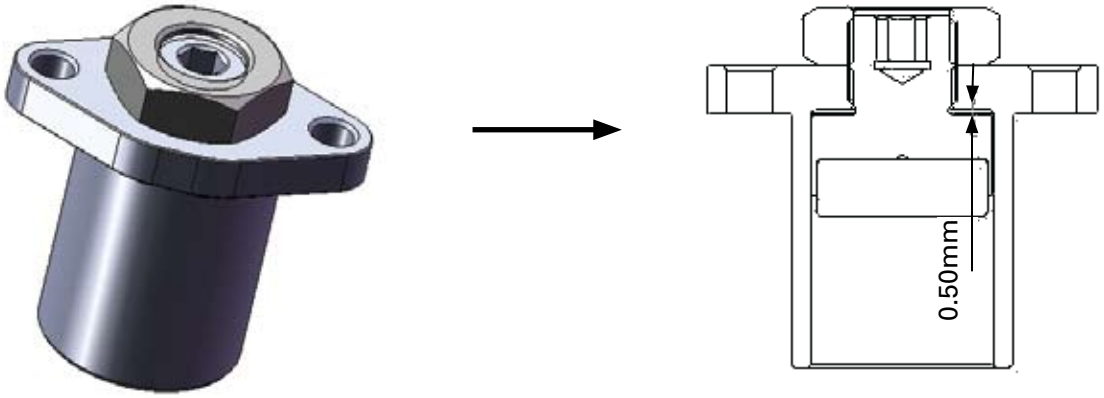


©09-2010 Mold Masters

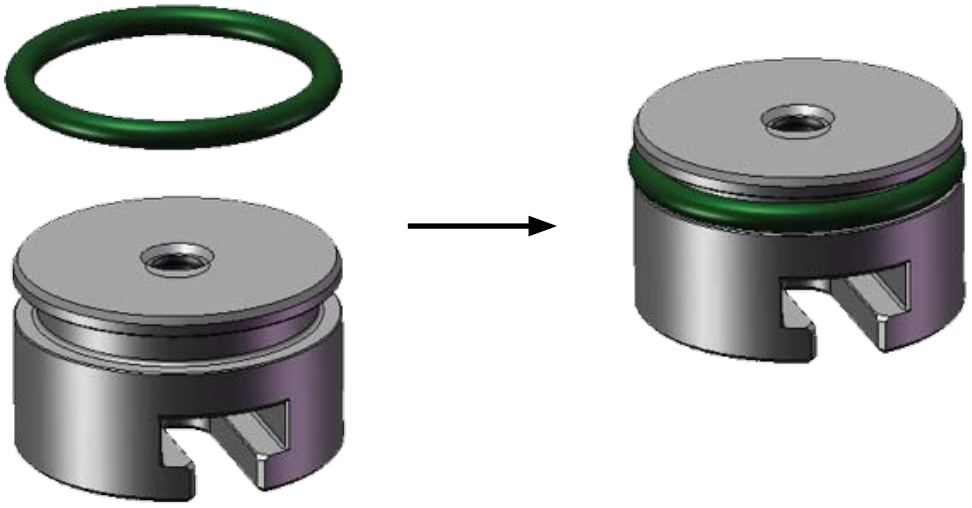
6. Assemble the nut and lock magnet holder.

   6.1 Assemble the jam nut M12-1.00 (NUTLM12F-01) as shown. Note: pitch of thread is 1.00mm per turn.

   6.2 Adjust the heights to have 0.50mm gap as shown (default setting for adjustability +/- 0.50mm). Re-examine valve pin height after final assembly into synchro-plate (at heated condition). Re-adjust, as required, to ensure proper valve pin height.

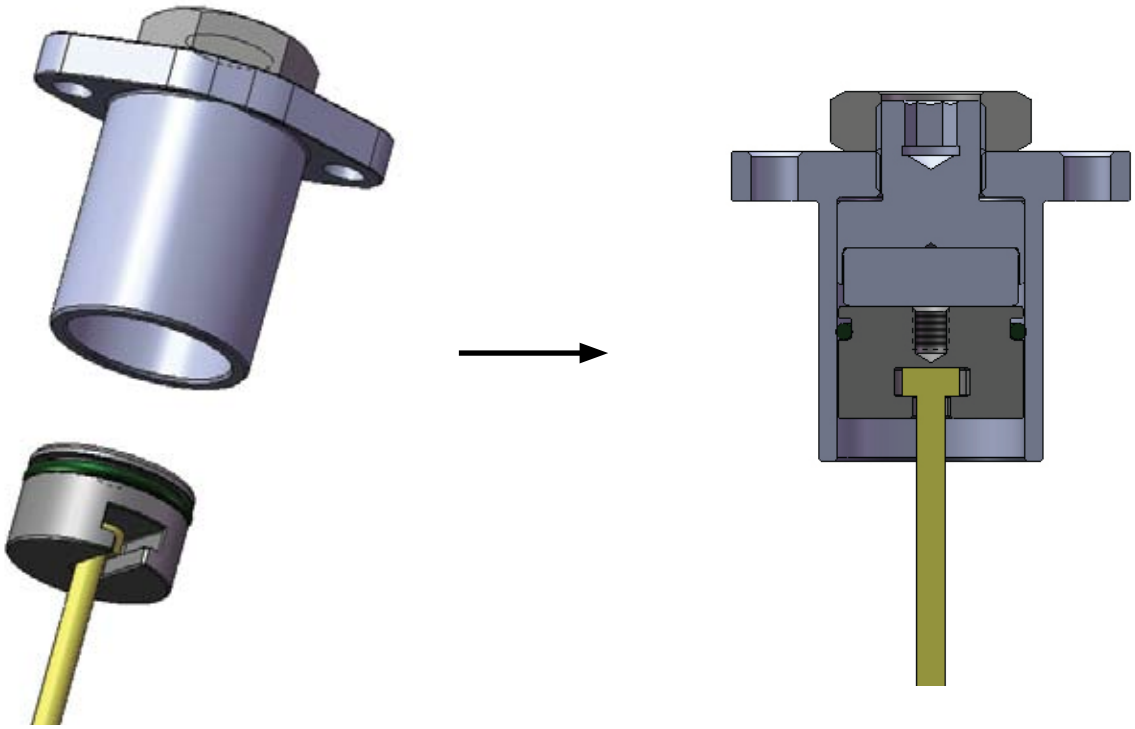


7. Lubricate O-ring (PNOR2-017) with a thin layer of high temperature grease and place it into the related groove on the valve pin holder (VPHOLDER12). Clean excessive grease from top and side faces.

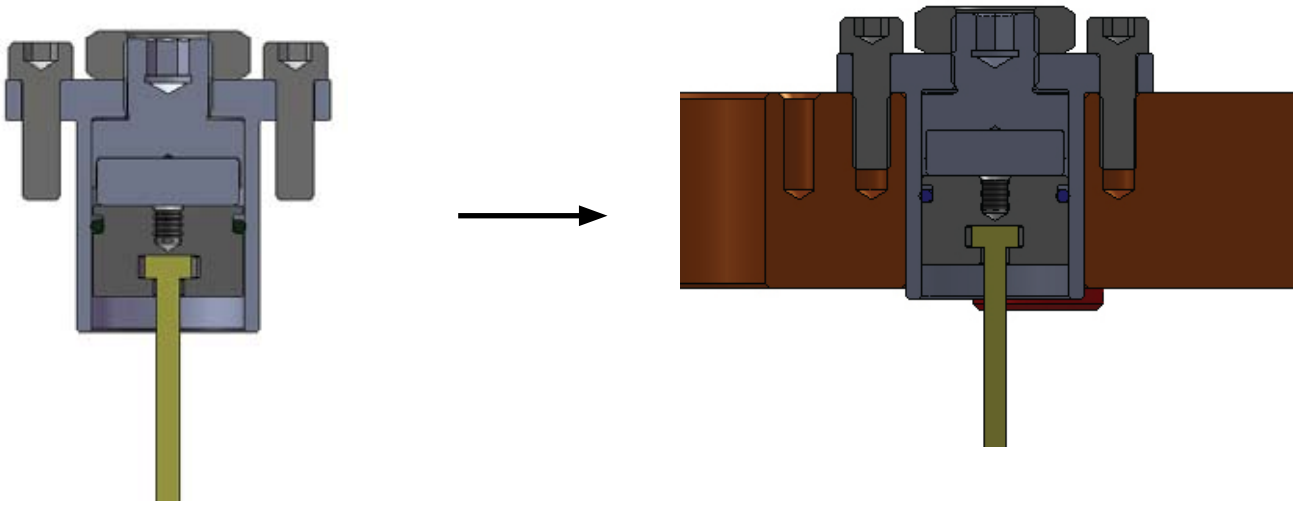


©09-2010

8. Place the valve pin into the valve pin holder slot and then gently place the assembly into the housing assembly (avoid impact forces on the magnet).

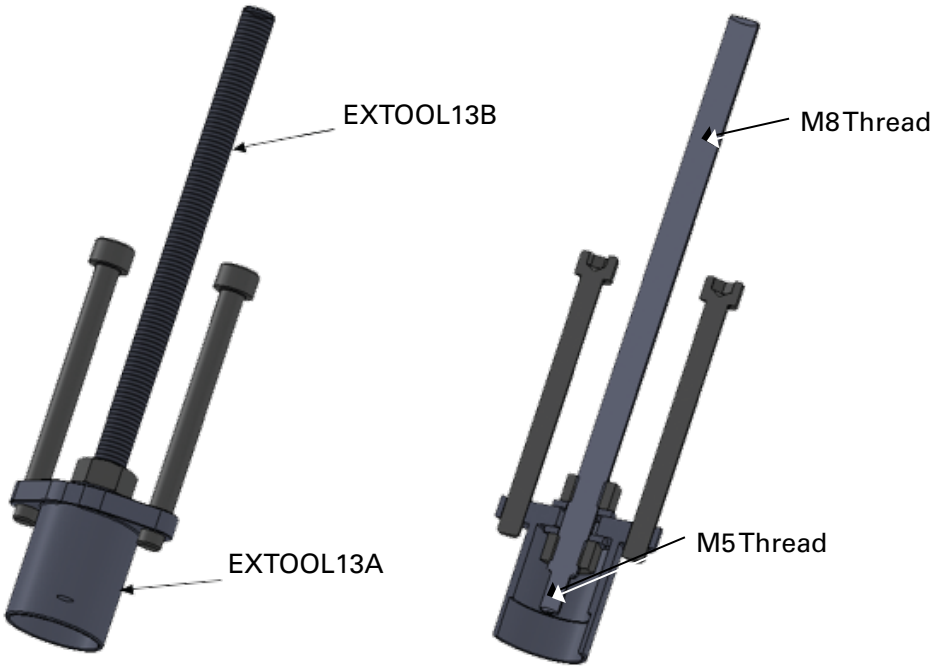


9. The *Mag-Pin* is now ready for assembly into the synchro-plate. Heat up the system and complete final valve pin height adjustment if valve pin protrusion is not correct.

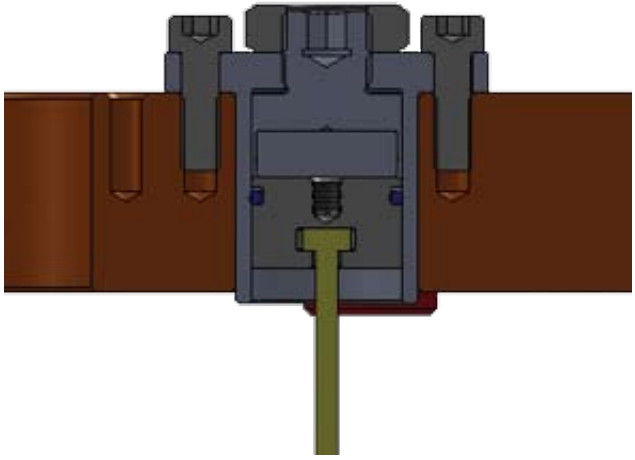


Mag-Pin Extraction

NOTE
For this procedure *Mold-Masters* recommends using Extraction Tool MM Part # EXTOOL13 (see below) with Extraction Tool MM Part # EXTOOLAS01.

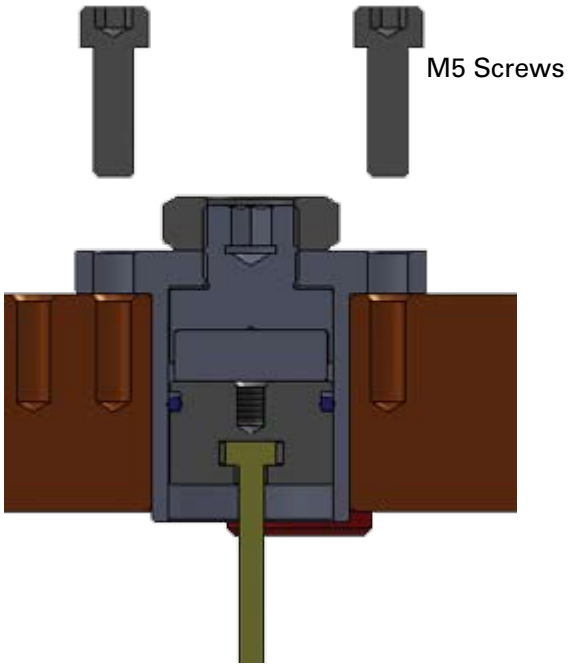


1. Heat the system to processing temperature, ensuring the manifold reaches temperature.
2. Extract the *Mag-Pin* Assemblies individually. Do not lift the whole synchro-plate while *Mag-Pin* Assemblies are installed.

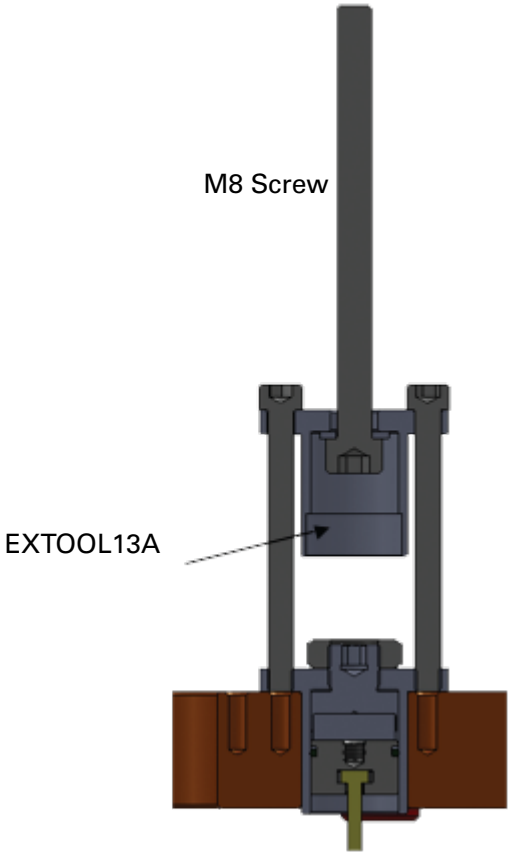


©09-2010

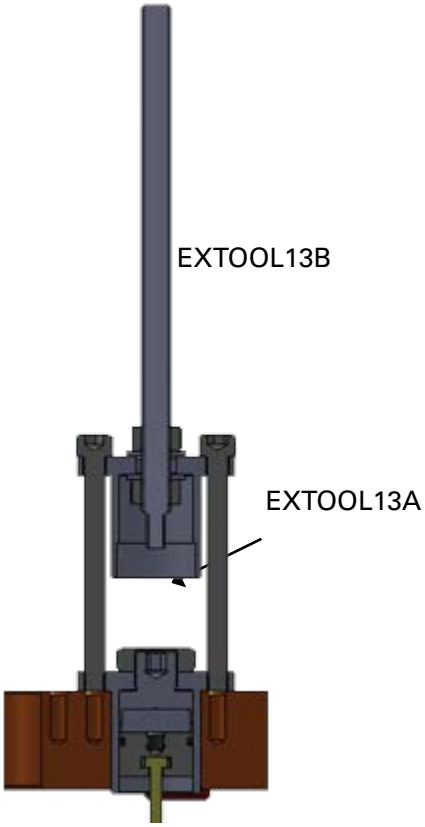
3. Remove the M5 screws securing the *Mag-Pin* Assembly to the Synchro-Plate.



3.1 Extraction Option 1: Use Extraction Tool EXTOOL13A with a M8 screw. Place Extraction Tool EXTOOL13A on top of valve pin holder. Couple Extraction Tool EXTOOLAS01 with a M8 screw and M8 washer (WASHERM8-1) and extract *Mag-Pin* Assembly.

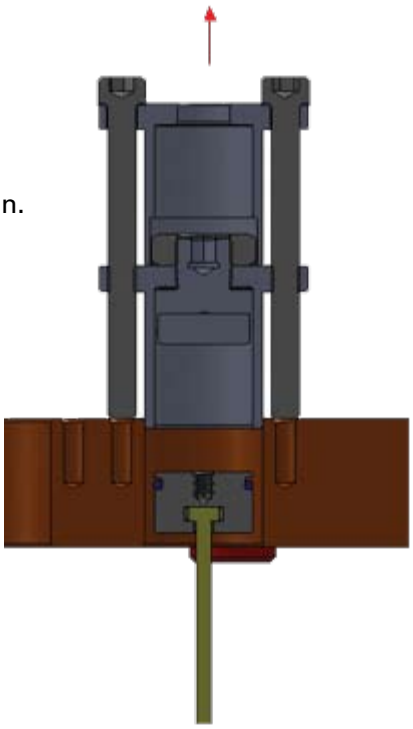


3.2 Extraction Option 2: Place Extraction Tool EXTOOL13A on top of valve pin holder. Couple Extraction Tool EXTOOLAS01 with EXTOOL13B and extract *Mag-Pin* Assembly.



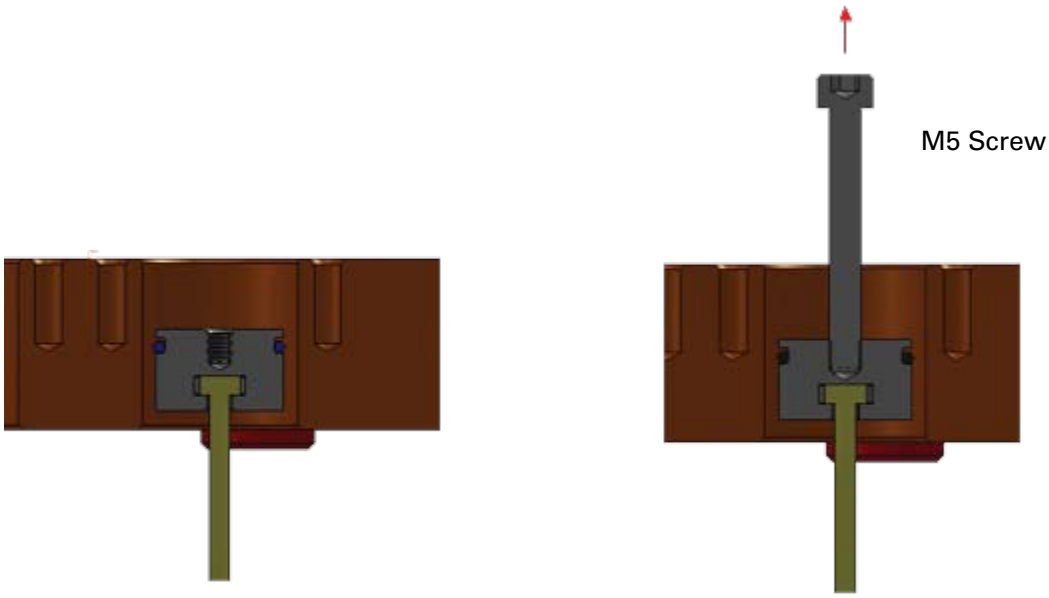
4. If the valve pin gets stuck and the mechanism detaches from the magnet interface, you may follow one of the options given on the next page.

Early disengagement of valve pin.

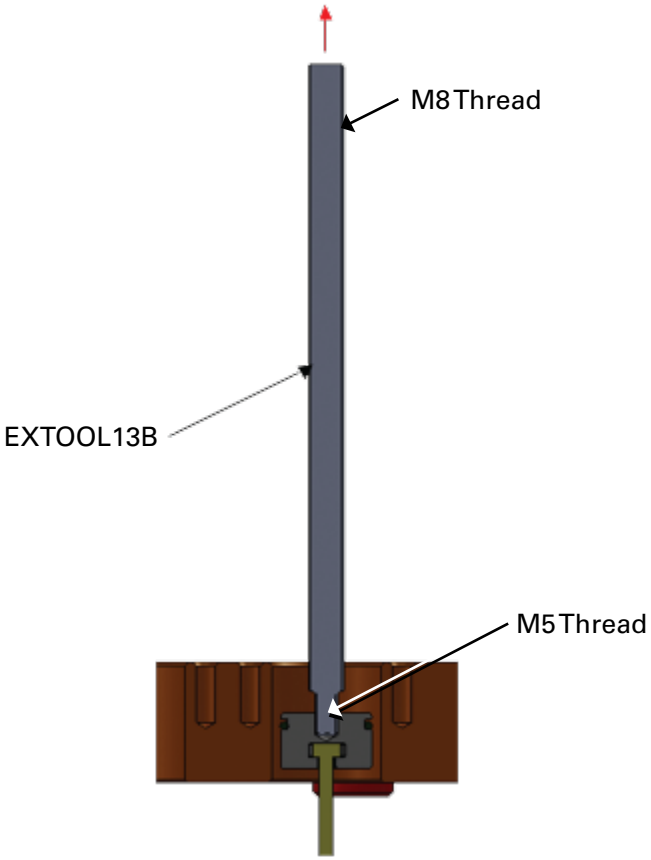


©09-2010

Option 1: Extract the valve pin and holder with a M5 screw or other adaptor with a M5 thread in front.



Option 2: Extract the valve pin and holder using Extraction Tool EXTOOLAS01 with Extraction Tool EXTOOL13B, using M5 thread end for extraction of valve pin.



©09-2010 Mold Masters

Section 7 - Maintenance

Introduction

This chapter is a guide to maintaining the *Mold-Masters E-Drive* system. See the *Mold-Masters* Hot Runner User Manual for other maintenance procedures.

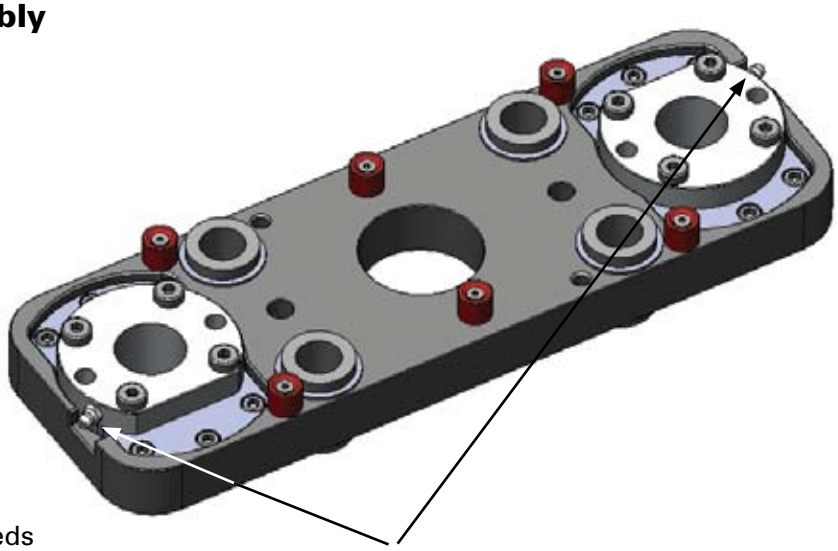
- Repairs that should be performed by *Mold-Masters* personnel are not included.
- If you need an item repaired that is not included in this section, please call *Mold-Masters* support. The phone number and system identifier is located on the mold.

Recommended Maintenance

Every 6 months or 500,000 cycles (whichever comes first).

Lubrication of Ball-Screw Assembly

1. Recommended grease is Castrol Longtime PD2 (MM Part # 104L1105I).
2. For first time assembly; use 4g (4cc) per ball-nut.
3. For 6 month or 500,000 cycles maintenance (whichever comes first); use 2g (2cc) per ball-nut.
   See "Assembly/Disassembly of Top Plate" on following page.



Grease line on Ball-Nuts
(Ball-Screws not shown)

Inspection of the Timing Belt

If the timing belt becomes too loose and needs to be tensioned, follow instructions "Tightening the Belt" in Section 5.

If the timing belt is worn out and needs to be replaced, follow instructions "First Time Installation or Replacement of the Belt" in Section 5.

Replacement of Bearings

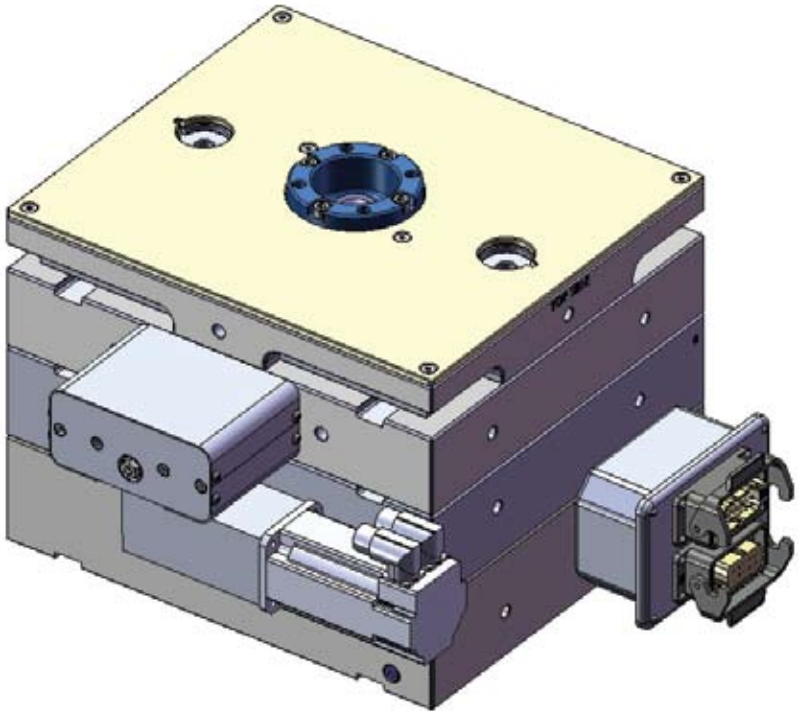
After 1.5 million (1,500,000) cycles, replace Fixed and Floating Bearings (Identified on page 5-1).

Part Name	Mold-Master Part Number	Qty
Fixed Bearing	LBSFB001	2 per Synchro-plate
Floating Bearing	FBSB61904-2RS1	2 per Synchro-plate

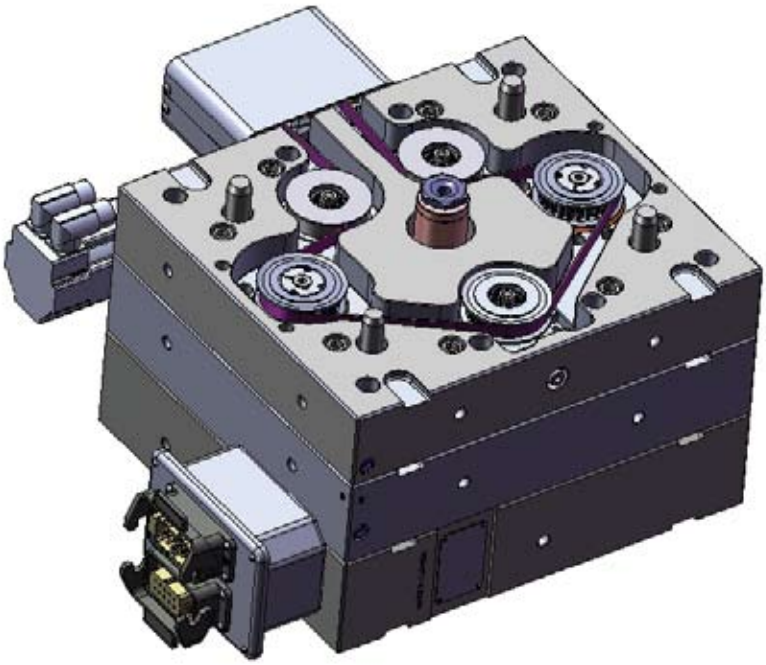
Not under documentation control if printed. May be revised without notice
Electronic version is available at www.moldmasters.com
©09-2010

Assembly / Disassembly of Top Plate

Assembled System

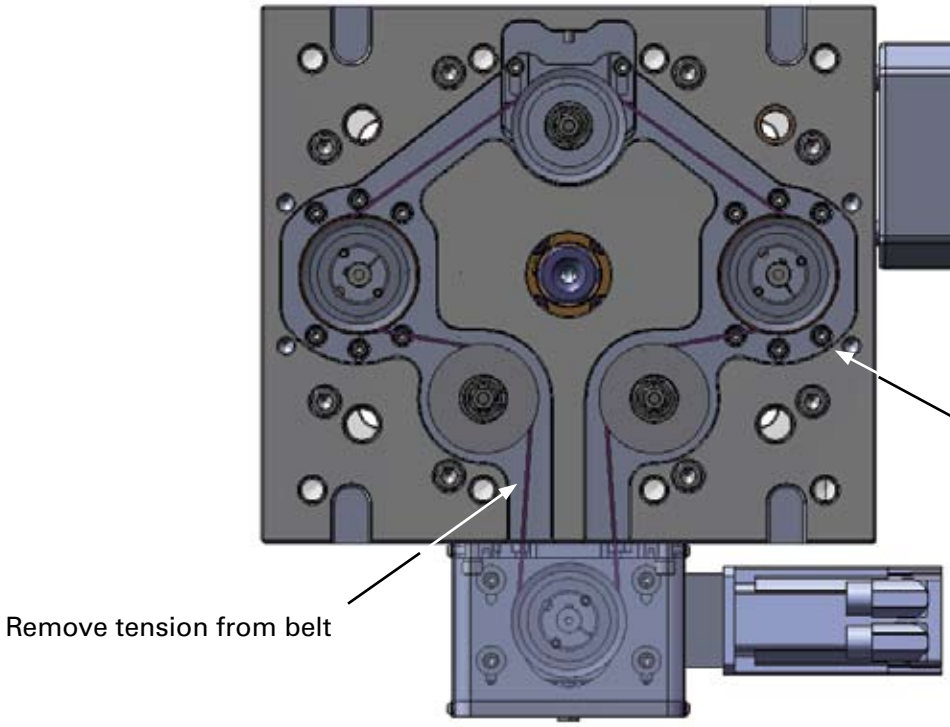


1. Remove plates up to top-plate.
2. Remove insulation-plate.
3. Remove locating-ring and any clamp-plate.
4. Remove all screws on top plate.



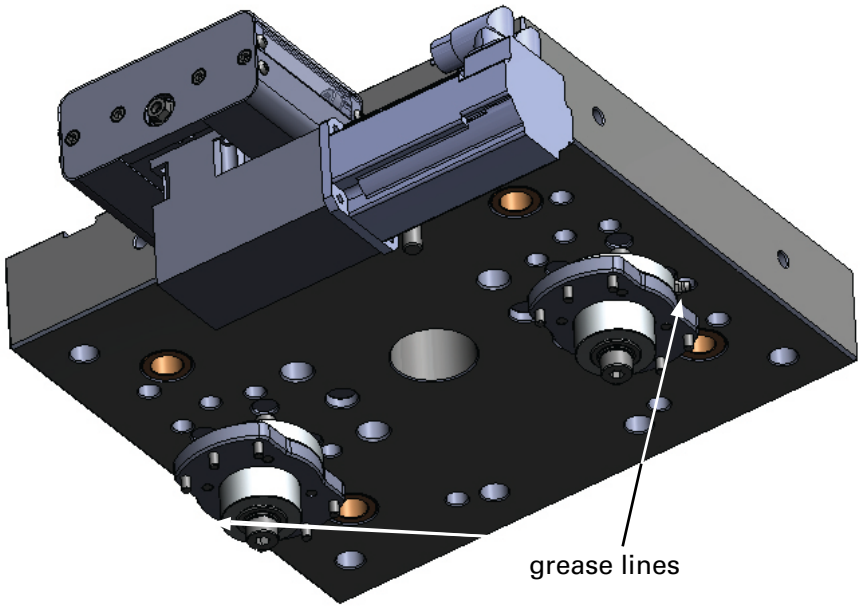
©09-2010 Mold Masters

5. Remove tension from belt and remove ball-nut holder screws. Make sure hot runner system is completely heated up.


Loosen 12 screws attached to ball-screw nut by a hex key tool with strong hex tip.
Remove 12 screws attached to ball-screw nut plates with KEY-BPHEXTKEY5.0.
Remove tension from belt

6. Lift the top plate assembly carefully to have access to grease lines.

CAUTION
Be very careful with ball-nuts. Make sure both ball-nuts remain in proper orientation and at same elevation. If any of the ball-nuts get rotated, without having proper arbor at the end of ball-screws, balls may fall out of assembly. It would be very difficult to find and reassemble the balls and ball-nut. In such case the ball-nut may need to be scrapped.



©09-2010 Mold Masters

Index

A

applications 6-7
Assembly 5-1
Assembly (Center Section) 5-1

B

Ball-Screw 4-6
Ball-Screw Assembly 7-1
Bearings Replacement 7-1
Belt 5-14,7-1

C

Clamping plate 5-2
Cleaning 4-3
Components 4-6
Controller 3-4

D

Documentation 1-1

E

E-Drive System 4-4

F

Fixed Bearing 7-1
Fix Idler 4-6
Floating Bearing 7-1

G

Global Support 2-1
grease 7-1

H

Hazards 3-2, 3-3

I

insulation plate 5-2
interface plate 5-2
International Representatives 2-2
Introduction 1-1

L

leader pins 5-3
locating ring 5-2

M

magnet holder 6-3
Magnets 3-4, 6-3
Mag-Pin 6-1
Mag-Pin Extraction 6-8
Maintenance 7-1
Manifold plate 5-2
Manufacturing Facilities 2-1
Misalignment 5-15
Motor Mount 4-6

O

O-ring 6-3

P

parallelism 5-2
Patents 1-2
plastic spacers 6-3
Preparation 4-1

R

Regional Offices 2-1,?2-2
Release Details 1-1

S

Safety 3-1
Safety-E-Drive 3-4
Safety Hazards 3-1
Safety-Mag-Pin 3-4
Screw Lengths 4-1
Symbols 1-1
synchro-plate 5-2
System Type 4-3

T

Temperatures 3-4
Tensioning Idler Assembly 4-6
Tools 4-2
top plate 5-2
Top Plate Assembly / Disassembly 7-2
Trademarks and Patents 1-2

U

Unpacking 4-3

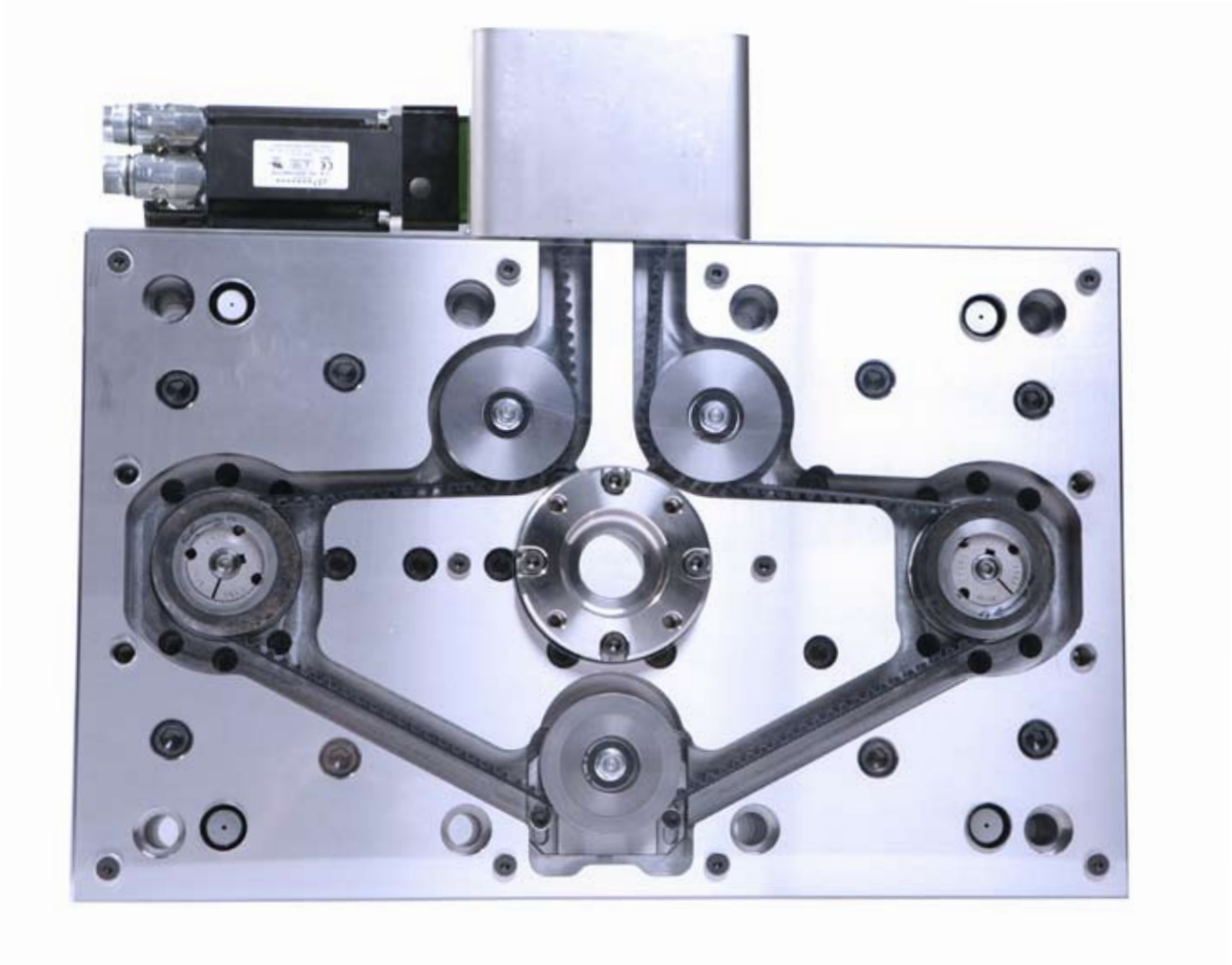
V

Valve pin holders 5-2

W

Warranty and Documentation 1-1

Not under documentation control if printed. May be revised without notice
Electronic version is available at www.moldmasters.com
©09-2010 Mold Masters



www.moldmasters.com

Mold-Masters® and the Mold-Masters logo are registered trademarks of Mold-Masters (2007) Limited. © 2010. EMMEDUM05

Mold Masters®
performance delivered